THE IRON TRADE REVIEW

VOLUME XXXIV. CLEVELAND, O., JUNE 6, 1901. NUMBER 23

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Surface indications in the iron trade continue to point to easier conditions. That there is likely to be an early resumption of buying, appeals strongly to those who look for a continuance of the present basis, and this view is reinforced by the persistently heavy consumption. Two questions come up in attempting to judge whether the present rate will continue: the effect of the machinists' strike, and the size of the year's crops. In certain localities the strike has cut down consumption, though the curtailment is not a large percentage of the material entering foundries and machine shops. There are signs that in these spots the struggle may be drawn out, with possibility of extensions through sympathy strikes. Thus far the molders have kept at work, except as the idleness of connected machine shops compelled a shutdown, and at the moment there is less trouble in foundries than for months, with both sides disposed to secure an amicable settlement at the wage conference of next week. The crop factor has become more prominent in the week through the publication of less favorable reports. Beginning at the foundation of the iron industry, the Lake Superior iron ore situation is dominated by the handling facilities at Lake Erie docks. The backward spring and the engineers' strike have shortened the season by fully 15 per cent, and while vessels are plentiful enough the lower lake docks are crowded as never before, while cars seem even scarcer than in 1900. This factor will not get much attention from the trade at large but its importance may be more generally recognized as the season advances. In pig iron the weaker tendency heretofore noted continues, but business is too limited to reflect the real drift. The principal transaction of the past week was the purchase of 50,000 tons of Bessemer iron from Central Western furnaces for shipment to a Colorado steel works. The bulk of the order went to Central and Southern Ohio producers. In the Valleys trading in Bessemer is practically at a standstill, pending the placing of contracts by the United States Steel Corporation for its supply in the second half. This buying when it comes may give the whole market such an impulse as was felt in February when the merchant furnaces of the Valleys took on so large a tonnage. The finished material market on which the pig iron situation hinges is sustained rather by the heavy business booked than by new demand. Steel billets are in fair demand from makers of specialties, and the Bessemer steel mills with their heavy railroad business, promise to be in a strong position as regards billets for the rest of the year. The failure of some consumers of plates and bars to specify as expected is the one feature of the present situation that is not entirely satisfactory to the mills On the other hand the increasing accumulation of business on the books of structural mills is proof of a volume of structural work in buildings and bridges beyond any record.

PITTSBURG.

OFFICE OF *The Iron Trade Review*, }
439 PARK BUILDING, June 5. }

While many consumers of finished material are still holding off on contracts for second half delivery, a large tonnage has already been placed and many mills in this district are already pretty well sold up for the third quarter. Little of this tonnage was placed during the past two weeks, however, as the buying has fallen off to a great extent during the past fifteen days, and but for the activity early in May, the books of the mills would make an extremely poor showing for that month.

The pig iron market for the same period was quieter than at any time in the previous six months, but despite this lack of buying it is asserted that the stocks in the Valleys are lower than they were on May 1, and the furnaces are being urged to make shipments as fast as possible. The buying of pig iron the past week has been in small lots only and for immediate shipment and prices are slightly lower than they were a week ago. There has been practically no buying of Bessemer iron and while $15.50 is being done at the furnace for small lots, it would not be surprising to hear of a concession of 25 cents per ton on a large order for extended delivery.

The plate manufacturers are not closing new business as fast as they could desire, and the tonnage on contracts booked months ago is being rolled much faster than new business is being received. Yet despite this, they have so much confidence in prevailing conditions, with strength shown in all finished lines, that they will not change quotations at the meeting to be held in New York this week.

The structural mills on the other hand are receiving orders amounting to more than the current output of their mills, and a greater tonnage is carried on the books of the Pittsburg manufacturers than ever in the history of the trade. The immense amount of building that is being carried on all over the country is partly the cause of this immense demand. The railroads of the country are building and remodeling bridges as they have never done before and the American Bridge Co. and the independent bridge builders are rushed with work, much of which will be carried over until next year, as the mills will be unable to make deliveries if the demand keeps up, of which there is every indication.

The confidence which the trade generally has in existing conditions is indicated by the large amount of money that is being expended this year for improvements and new construction in this district. A further indication is the incorporation of new companies for the manufacture of finished steel products. The Pittsburg Steel Co. is about to be launched with a capitaliation of $2,500,000 to enter the wire and wire nail business, and the list of independent manufacturers is constantly increasing.

The cost of new construction, improvements and enlargements undertaken in this district during the past few months would easily reach $10,000,000, and in the Wheeling district new construction has been decided upon that will amount to several millions of dollars.

PIG IRON.—The pig iron market during the past week has been extremely quiet and the buying movement for the second half is not anticipated before the end of the month. Few of the Valley furnaces have sold any of their Bessemer product for delivery during the last half of the year, but if the buying does not come up to expectations many of them can operate on forge and foundry iron, a considerable tonnage of which has been sold for delivery during the third quarter. The tonnage that the United States Steel Corporation will have to place with the merchant furnaces will largely determine the price for Bessemer for second half delivery and it is doubtful if the requirements of this giant corporation for a six months' period over and above its own furnace production can be even approximated so far in advance. Thus it would seem that while a considerable tonnage will be closed for the latter part of

June, there will have to be further buying later in the year to cover unlooked-for requirements and shortcomings in its own pig iron production. A number of the foundrymen in this district have contracts running well into the second half, but the majority have not shown any disposition to close for second half delivery. The buying during the past week was limited almost wholly to small lots and we have been advised of several small sales at $14.50 for No. 2 foundry, delivered Pittsburg. On forge iron no better than $14.25, Pittsburg, is being done, with little buying. We revise quotations as follows:

Bessemer, Valley	$15 25 to $15 50
Bessemer, Pittsburg	16 00 to 16 25
No. 1 Foundry	15 00 to 15 25
No. 2 Foundry	14 50 to 15 75
No. 3 Foundry	14 00 to 14 25
Gray Forge, Pittsburg	14 25

STEEL.—Bessemer billets for immediate delivery continue scarce and on several small lots a premium from 50 cents to $1 has been paid at the mill, Pittsburg, over the prevailing quotation of $24 at Pittsburg, Wheeling or Valley. Open-hearth billets continue scarce at $27 to $27.50 per ton.

FERRO-MANGANESE.—The price of ferro-manganese 80 per cent domestic is unchanged at $58.50 per ton in carload lots, delivered at buyer's mill.

MUCK BAR.—We note the sale of several carloads of muck iron at $27 per ton at mill, Pittsburg.

SKELP.—There is little buying of skelp and prices have eased off somewhat from last week. Grooved and sheared steel skelp has sold during the week at 1.70c, while grooved and sheared iron skelp is held at 1.80c to 1.85c, Pittsburg, according to the width.

SPELTER.—There has been considerable buying during the past week and prices are somewhat better than for several months. We quote prime Western grades at 3.90c to 3.95c.

RAILS AND TRACK MATERIAL.—Mills in this district continue in full operation on contracts placed during the spring. A good tonnage is in view owing to the activity in new street railway operations. Light rails also continue in excellent demand at high prices. The demand for track material is also strong owing to the large amount of work that is being done by the railroads this year. We quote standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32; light rails, 8 to 12 pounds, $36 to $37; 16 pounds, $35; 20 pounds, $34; 25 to 40 pounds, $32. Track material: Spikes, 1.95c to 2c; track bolts, square heads, 2.60c; hexagon heads, 2.70c; fish plates, 1.60c to 1.70c.

PLATES.—The amount of new business that is being taken by the mills of this district is not equal to the output and the mills are overtaking their old contracts. A meeting of the plate manufacturers will be held this week at New York, but no change in price is anticipated. Our quotations remain as follows: Tank plate, ¼-inch thick up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. M. B. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c; and it ranges in price to 3c. Plates more than 100 inches wide, 5 cents extra 100 pounds. Plates 3-16 of an inch in thickness, $1 extra; gauges Nos. 8 and 9, $2 extra. These quotations are based on carload lots, with 5 cents extra a hundred pounds for less than carload lots. Terms, net cash in 30 days.

BARS.—A good amount of business has been placed during the week in small lots at 1.45c to 1.50c. Contracts for more than 100 tons of steel bars can be placed at 1.40c. There is little doing in iron bars. Common iron bars are quoted 1.50c to 1.55c, while refined iron bars are held at 1.75c to 1.85c.

SHEETS.—There has been no change in the condition of the sheet market during the past week. Mills are not catching up on old contracts and a large amount of new business is being placed. Galvanized sheets are firm and unchanged. Our quotations in carload lots are as follows: Black sheets, one pass through cold rolls, No. 30, 3.65c; No. 29, 3.55c; No. 28, 3.35c; No. 27, 3.25c; Nos. 25-26, 3.15c; Nos. 22-24, 3.05c; Nos. 19-21, 2.95c; Nos. 17-18, 2.80c; Nos. 15-16, 2.70c; Nos. 13-14, 2.60c; Nos. 10-12, 2.50c. For more than carload lots a reduction of 5 cents per 100 pounds is made; for less than carload lots in advance of 15 cents per 100 pounds over the above price is asked. Galvanized sheets are strong at 70 and 5 off.

PIPES AND TUBES.—Independent producers of tubing and casing are quoting higher prices than the leading producer, and owing to the large amount of business that is being offered are receiving their share of the tonnage. Jobbers report that the demand is phenomenal and in no district in the country have they been able to accumulate stocks. Prices despite the big demand remain unchanged. Discounts to consumers, in carload lots, Pittsburg, are as follows:

STRUCTURAL MATERIAL.—The manufacturers in this district are carrying a larger tonnage on their books than ever in their history. New business is being closed daily and the tonnage received is greater than the daily output of the mills. The large amount of building that is being carried on throughout the country is the cause of this big demand. Prices remain unchanged, as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles, from 3 to 6 inches, 1.60c; universal mill plates, 1.60c.

WIRE AND WIRE NAILS.—Another independent producer of wire and wire nails will be in the market for business before the elapse of another year. The Pittsburg Steel Co. is the name of the new concern, and a plant is to be erected that will cost about $2,000,000. Manufacturers are making better deliveries on wire and wire nails than for some time. Prices are unchanged as follows: Single carloads of wire nails to jobbers, $2.30, Pittsburg; to retailers, $2.40; plain wire, carload lots, is now quoted at $2.25 to jobbers and $2.35 to retailers; painted barb wire, $2.60, in carload lots to jobbers, and $2.70 to retailers; galvanized barb wire, $2 in carload lots to jobbers, and $3 to retailers. Cut nails are quoted at $2, Pittsburg, in carload lots, 2 per cent off in 10 days.

MERCHANT STEEL.—The manufacturers of steel tires and wheels placed a considerable tonnage of tire steel with the leading producer of this product in Pittsburg this week. For large lots 1.60c is quoted, while on small lots as high as 1.80c is asked. The demand for shafting continues strong and a large tonnage for second half delivery was placed during the week. We revise quotations as follows: Turned, cold rolled and ground shafting at 55 per cent off for car lots and 50 per cent off for less than car lots; tire steel in carload lots and over, 1.60c; less than carload lots, 1.70c to 1.80c. Toe calk is held at 1.70c in large lots, and in small lots as high as 1.85c. Tool steel is held at 7c and upwards, according to quality; hoops and bands, 1.95c to 2c.

OLD MATERIAL.—The old material market continues to sag and prices are somewhat lower than those of a week back. There is little buying. Our quotations, gross tons, revised are as follows: Heavy melting stock, $16 to $16.25; low phosphorus melting stock, $17.50 to $18; steel rails, $16 to $16.50; busheling scrap, $13.50 to $14; No. 1 wrought, $17; iron rails, $19 to $20; cast borings, $7.50; cast scrap, $12.50 to $13.

COKE.—Furnacemen still hold off on contracts for second half delivery and owing to the immense outside coke production the indications are much in their favor at present. One odd lot of outside furnace coke was sold in Pittsburg last week at $1.50 per ton, a quotation much lower than any with in the past six months. The large outside interests are holding off for $1.70 for furnace coke for second half delivery, although they believe that they should receive at least $1.80, with the Connellsville product selling at $2 per ton, the present quotation. Foundry coke is held at $2.50 per ton for strictly Connellsville, while outside foundry coke is held at $2.15 to $2.25 per ton. For the week ending May 25 the total production of the Connellsville region amounted to $230,755 tons. This was a slight gain over the previous week. Shipments for the week aggregated 10,126 cars.

CHICAGO.

OFFICE OF *The Iron Trade Review*, 534 MONADNOCK BLOCK, June 4.

Conditions in this district remain practically the same as at last report. In all finished lines there is a heavy demand, and even in pig iron the market seems to have picked up somewhat, notwithstanding the strike. One firm reports that inquiries received during the past week are quite a little in ex-

cess of those for any one of the preceding three weeks, paradoxical as this may seem. The strike seems to be felt more in Milwaukee than in any other city or locality in the West, probably because the walk-out in that city has been more general. One seller states that he is using the product of a Milwaukee furnace which usually supplies most of the wants of foundries in that city, in catching up on other deliveries.

PIG IRON.—Rogers, Brown & Co. are distributing a circular in which they state that in the four months from January 1st to May 1st, 1901, they sold 5,724 tons of pig iron for every business day, and 2,194 tons of foundry, furnace coke and other materials, which is an indication of the enormous tonnage that has been melted this year. This exceeds all previous records made by this company. Little business has been transacted during the past week, though one seller reports considerably more inquiries than had been received for some weeks. None of the sellers are worrying over the conditions affecting the pig iron market, however, as most of the furnaces are stocked up with orders sufficient to keep them going for a few months. We quote prices unchanged as follows:

Lake Sup. Charcoal	$17 50 to $18 00	Southern Coke No. 4	$13 90 to $14 15
Local Coke Fdy. No. 1	16 00 to 16 50	Southern No. 1 Soft	15 40 to 15 55
Local Coke Fdy. No. 2	15 50 to 16 00	Southern No. 2 Soft	14 90 to 15 15
Local Coke Fdy. No. 3	15 00 to 15 50	Southern Silveries	15 45 to 15 50
LocalScotchFdy. No. 1	16 00 to 16 50	Jackson Co. Silveries	17 00 to 17 50
LocalScotchFdy. No. 2	15 50 to 16 00	OhioStrong Softeners	16 50 to 17 00
LocalScotchFdy. No. 3	15 00 to 15 50	Alabama Car Wheel	21 00 to 22 05
Southern Coke No. 1	15 40 to 15 65	Malleable Bessemer	16 00 to 17 00
Southern Coke No. 2	14 90 to 15 65	Coke Bessemer	17 50 to 18 50
Southern Coke No. 3	14 20 to 14 60		

BARS.—An average tonnage has been booked during the past week, and prices are holding very firm. There is a tendency in some quarters to push prices up, and it will not be surprising when the demand for old material increases, if an advance is not made. For current delivery, prices are slightly in excess of quotations, which are 1.55c to 1.60c for iron and 1.60c to 1.65c for steel.

SHEETS.—Local sellers state that they are absolutely unable to keep apace with the orders that come in, and continue to divide their stock among the most urgent of the consumers. We quote prices as follows: No. 27 black, 3.40c to 3.50c, and galvanized 65 and 10 per cent from store and 70 per cent and 5 per cent from mill, Pittsburg.

BILLETS.—Though none are offered for sale we quote open-hearth billets $35 and Bessemer billets $30, Chicago.

RAILS AND TRACK SUPPLIES.—Inquiries are beginning to be made on lots of standard rails for delivery late this year or early next year, and in some cases for such deliveries as the mills can promise in 1902. Orders are turned down daily because satisfactory delivery cannot be made. There is no diminution in the demand for track supplies or light rails, but in the case of the former, as reported last week, the mills are sold up for some months ahead. We quote prices unchanged as follows: Standard rails, $28; light sections, $31 to $33; splice bars, 1.60c to 1.70c; spikes, 1.90c to 2c; track bolts, hexagon nuts, 2.80c to 2.90c; square nuts, 2.65c to 2.75c.

PLATES.—The demand for this material continues fairly proportioned to that for other finished lines, and one seller reports having still a limited tonnage in both sheared and universal plates for sale. We quote prices unchanged as follows: Mill shipments, Chicago delivery: Tank steel, 1.75c; flange steel, 1.90c to 2c; marine steel, 1.95c; firebox steel, ordinary, 2c to 2.10c; firebox special, 2.25c and upwards. Tank steel from store, 1.90c to 2c; flange steel from store, 2c to 2.10c.

MERCHANT STEEL.—The market remains unchanged in this branch of the trade. A fair amount of business has been closed, and some good sized contracts are pending with the implement manufacturing trade. Prices remain as follows for mill shipments, Chicago delivery: Smooth finished tire steel, 1.90c to 2c; open-hearth spring steel, 2.50c to 2.75c; toe calk, 2.40c to 2.60c; sleigh shoe, 1.85c to 1.90c; cutter shoe, 2.40c to 2.60c; ordinary tool steel, 6c to 7c; specials, 13c and upwards. Cold rolled shafting, carload lots, 55 per cent and upward.

MERCHANT PIPE.—Orders representing a large tonnage continue to be received from the oil districts in Texas and Washington. In the Beaumont district, a slight increase has been made, due to an advance in freight rates to that territory. We quote manufacturers' prices unchanged as follows:

MERCHANT PIPE.

	In carloads. Blk.	In carloads. Galvd.	Less than carloads. Blk.	Less than carloads. Galvd.
½ to ⅝ inch and 11 to 12 inches	59.2	46.2	54.9	40.5
¾ to 10 inches	66.7	53.3	61.9	49.9

WIRE AND WIRE NAILS.—The volume of business shows no diminution. Prices remain as follows: Carloads of wire nails to jobbers, $2.40, Chicago; to retailers, $2.50; plain wire, carloads to jobbers, $2.35; to retailers, $2.45; painted barb wire to jobbers, carloads, $2.70; to retailers, $2.80; galvanized barb wire, carloads to jobbers, $3; to retailers, $3.10.

OLD MATERIAL.—Most of the trading that has been done has been confined to railroads, these selling direct to the consumer. The market remains very weak, with the prospect of being so for a few weeks longer. Dealers' selling prices per gross ton are as follows:

Old iron rails	$19 00 to $19 50	Old Wheels	$16 00 to $16 50
Old steel rails, long	15 00 to 16 00	Heavy melting steel	13 00 to 13 50
Old steel rails, mixed	14 00 to 15 00	Mixed country steel	10 00 to 10 50
Relaying rails	20 00 to 22 00		

The following are selling prices per net ton:

No. 1 R. R. wrought	$14 00 to $14 50	Iron axles	$19 00 to $19 50
No. 2 R. R. wrought	12 50 to 13 00	Cast borings	4 00 to 4 50
Dealers' forge	12 00 to 12 50	Wrought turnings	9 00 to 9 50
No. 1 busheling	10 00 to 10 50	Iron axle turnings	10 50 to 11 00
Heavy cast	11 00 to 11 50	Steel axle turnings	9 50 to 10 00
Railway malleable	11 50 to 12 00	Stove plates	8 50 to 9 00
Country malleable	10 50 to 11 00	Old iron splice bars	16 00 to 16 50

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, June 5.

The ore market is still extremely quiet. As compared with other years the Eastern furnacemen have been more liberal buyers, within the limit of their requirements, than those of the Valleys and other immediately tributary districts. It is understood that some of the term contracts for Mesabi non-Bessemer ores made this season were with Eastern buyers. The question of dispatch is one that shippers are finding unexpectedly troublesome thus far. Boats are waiting six deep at Lake Erie docks in many cases, and if the delays thus far experienced in unloading are not cured the season's total will be far less than is counted on in some quarters. With 3,000,000 tons of ore on docks at the opening of the season, unloading facilities practically the same as last year's, and apparently fewer cars available than in the preceding season, though railroads have been buyers of ore and coal cars meantime, the lower lake situation is more of a factor in determining the season's shipments than are the upper lake railroads and docks or the supply of vessel tonnage. The Lake Erie end of the ore handling machinery of the lakes promises to assume an importance that some prophets for 1901 have not allowed for in their reckoning. The United States Steel Corporation is credited with charters amounting to 3,500,000 to 5,000,000 tons of outside vessel capacity. Owing to the shortening of the season its own boats will not carry more than 8,500,000 tons. Official figures for ore shipments in May are not yet made up, but from the three ports at the head of the lake the total to June 1 is reported to be more than 1,000,000 tons less than to June 1, 1900.

PIG IRON.—There is very little buying of either Bessemer or foundry and forge irons. Inquiries have been made recently for iron for Western shipment, but the business went to Ohio furnaces in other than Valley districts. The quotation on Bessemer is $15.50 at furnace, but it is believed 25 to 50 cents less could be done on a round lot. Foundries are melting up to their full amount with a few exceptions in this city, but are not buying for second half of the year. No. 2 foundry is sold at from $14 to $14.50, Valley furnace and gray forge at $13.50 in the Valley. The weak iron of which reports have been current lately is said to represent largely off iron which the furnaces cannot ship on orders and which they are not disposed to carry until the next spurt, when it might without difficulty be shipped with regular grades. We quote as follows:

Bessemer	$16 00 to $16 25	Valley Scotch No. 1	$15 25 to $15 75
No. 1 Strong F'd'ry	15 25 to 15 75	Valley Scotch No. 2	14 75 to 15 00
No. 2 Strong F'dry	14 75 to 15 00	Gray forge, Valley	13 50 to 13 75
No. 3 Foundry	14 25 to 14 50	LakeSuperior charc'l	17 50 to 18 00

FINISHED MATERIAL.—No changes in prices are reported. In some instances buyers are accumulating material against the possibility of an interruption of the mills; but in general

shipments are light and bar and plate mills could take care of more business in some cases. Specifications on contracts are not what was expected in these lines, particularly in plates. Locally new business is quiet, and the immediate future is not entirely clear. We continue to quote 1.45c at Valley mill for bar iron; 1.40c Pittsburg for steel bars; 1.60c Pittsburg for angles, beams and channels; 3.20c to 3.25c Pittsburg for No. 27 sheets, one pass through cold rolls; 3.30c to 3.35c Pittsburg for No. 28.

CINCINNATI.

June 1.

Rogers, Brown & Co. say: "The week under review has been rather quiet in this territory. Owing to the machinists' strike the foundries are short of work, being only one-fourth of the average under normal conditions. There seems to be a feeling among those best informed that the prospects are good for an early settlement of the strike, and the resumption of work at the plants affected. While there is uneasiness on the part of some furnaces, others think that by not pressing sales at this time we will soon reach another period of buying activity similar to that beginning in February last. The market at that time took an unexpected upward trend, every buyer seeming anxious to cover his requirements to July 1st or longer. Unless melting is restricted by the strike extending well into June, the completion of the contracts made in February and March will not create much surplus stock at the foundries on July 1st, as competition has been large and without interruption until May 20th, when the labor troubles began."

Matthew Addy & Co. refer particularly in their report to the effect of the strikes in machine shops: "The week in pig iron has afforded no feature really worthy of comment. Current orders have been small, though there is a steady run of minor business for quick shipment. There is a most decided contrast between the pig iron market and that for steel, as the demand for the latter is brisk and large. In steel the demand is considerably in excess of the supply and for nearby deliveries it is not to be obtained at any price. The foundrymen are greatly disturbed over the labor situation. The strike of machinists has reduced the demand for castings so that many foundries are only running part time. In some places the foundries have been shut down altogether. This is discouraging, but of course it is only temporary. However, the machinists' strike has left many districts unaffected, and in these the consumption of iron is going on without interruption. Several considerable inquiries have been postponed until the settlement of these labor troubles. There is no doubt that with these satisfactorily adjusted pig iron would be at once in much livelier demand."

We quote for cash f. o. b. bars Cincinnati: Southern coke, No. 1 foundry, $14.25 to $14.50; No. 2 foundry, $13.75 to $14; No. 3 foundry, $13 to $13.50; No. 4 foundry, $12.50 to $12.75; gray forge, $12.25 to $12.50; No. 1 soft, $14.25 to $14.50; No. 2 soft, $13.75 to $14; Lake Superior coke No. 1, $15.25 to $15.50; No. 2, $14.75 to $15; Hanging Rock charcoal No. 1, $20 to $20.50; Jackson Co. Silvery No. 1, $15.50 to $16; Standard Southern car wheel, $17.75 to $18.75; Lake Superior charcoal, $18.50 to $19.

PHILADELPHIA.

June 4

Though the iron market has been quite dull in the week and surface indications do not point to any immediate activity, the undertone is one of strength. The fact that consumers of pig iron are ordering forward all the iron their contracts call for and are hastening deliveries in some cases is encouraging to the furnace industry, and in finished material the full operation of all the mills is still a leading factor. Just when there will be a new buying movement cannot be predicted, but makers are quite confident that on the completion of present contracts there will be another good volume of buying.

PIG IRON.—It is necessary to look at consumption rather than at current buying to preserve an optimistic attitude under present conditions. Some sellers, partly from temperament, are concerned because there is not a steady run of business, an the indifference of buyers is taken by some to indicate that lower prices are ahead. On whatever side it is tested, the situation appears strong. The only drawback is the occasional machine shop strike, though up to the present time there has been less interruption in the East than in some machinery centers of the West and Central West. The fact that buyers do not fear that the market will get away from them, and that sellers are not showing their anxiety by offering cut prices, is regarded as satisfactory indication that no great change in either direction will take place in the near future. Of course, with a considerable rise in prices between the first of the year and the first of May, there is not as much chance of an additional advance now as of a slight decline. Everything hinges on the way orders come in in the next four or five weeks. We quote for seaboard delivery or at nearby points as follows: No. 1 X foundry, $16 to $16.50; No. 2 X foundry, $15 to $15.50; No. 2 plain, $14.50 to $14.75; standard gray forge, $14.25 to $14.50; ordinary gray forge, $13.75 to $13.90.

FINISHED MATERIAL.—At the moment there is no special activity, but the position of the mills is strong, apart from the fact that shipments are greater just now than new orders booked. The excellent railroad business appears to be still the backbone of the situation, and while there has been in the last week some slight indication that crops will not be as heavy as counted on early in the season, the news is not such as to cause any serious set-back. The steadiness of prices is one of the good features of the situation, both buyer and seller apparently being satisfied with the present basis. We quote as follows for Philadelphia delivery: Bar iron, 1.57½c to 1.62½c; bar steel, 1.60c to 1.70c; plates, 1.75c to 1.80c; angles, 1.70c to 1.75c; beams, 1.75c to 1.80c.

OLD MATERIAL.—The feeling is a little weaker, and buyers seem to be holding off, with some consequent accumulation of stocks in dealers' hands. We quote the Philadelphia market as follows: Choice railroad scrap, $19 to $20; No. 1 yard scrap, $14 to $15; No. 2 light scrap, $13 to $14; machinery cast, $14 to $14.50; heavy steel scrap, $16.75 to $17; old iron rails, $19 to $20; old steel rails, $16.25 to $16.75; wrought turnings, $11.50 to $12; cast borings, $8.25 to $8.75; old car wheels, $17 to $18; old iron axles, $21.50 to 22.50.

BIRMINGHAM, ALA.

June 3

The local iron and steel market has been featureless the past two weeks and for that matter since the beginning of April. While the demand for the furnace and mill products has been exceedingly quiet for several weeks, still there is no immediate probability of a curtailment of production, as the companies have orders enough on the books, secured during the winter and spring months, to keep them busy for several weeks yet. The dullness that has prevailed recently, it is asserted by some authorities, is merely the reaction from an exceedingly active market, and does not indicate any marked depression for the summer. One authority in speaking of present conditions said: "There has been the characteristic dullness about the iron market that always follows an extraordinarily good season of sales. This dullness has had but little effect, but if it continues for some time you may look for a howl from the companies. The advance sales secured during the period of activity that prevailed earlier in the year are keeping the furnaces from accumulating stocks. Better calls are expected in a short time."

The demand for steel has continued good throughout the dull iron period, and the Tennessee company has made a number of sales at satisfactory prices.

The price of iron is now considerably lower than the basis five or six weeks ago. The difference in quotations is not very great, but it is stated on good authority that considerable concessions are made where business offers.

It is stated on authority that the steel mill at Ensley is to be enlarged by the addition of ten more furnaces. According to the report work on these furnaces is to begin during the summer and they are to be completed within one year. The demand for the product of the mill is said to be greater than its present capacity. When the rail mill goes in operation, about July 1, it will take more than the present output of the steel mill. The Alabama Steel & Wire Co. now takes about 175 tons a day.

J. W. Woolfolk announces that the Woodstock furnaces at Anniston, Ala., are to be put in blast during the summer, one of them on July 1 and the other about a month later. The company has recently acquired several thousand acres of red ore lands in Calhoun county, a few miles from Anniston.

PERSONAL.

John E. Searles of New York has been re-elected president of the LaFolette Coal, Iron & Railroad Co. at a meeting of the board of directors held at Knoxville Tenn., last week. The new furnace which the company is erecting at LaFolette, Tenn., is fast nearing completion and will probably be placed in blast in about two months.

Henry Phipps of Pittsburg, has purchased additional property in the city of New York at a cost of $325,000.

It was officially announced last week that Wallace H. Rowe, manager of the Pittsburg district of the American Steel & Wire Co., has resigned. Mr. Rowe went to Pittsburg in 1886 as treasurer and general manager of the Braddock Wire Co. of Braddock, Pa. When that company was merged in the American Steel & Wire Co., Mr. Rowe continued in the service of the greater company and for the past three years has had charge of the plants in the Pittsburg district.

Charles S. Guthrie, formerly president of the American Steel Hoop Co., was in Pittsburg last week for the purpose of closing up some private business matters. Mr. Guthrie will spend the summer in the East with his family.

W. R. Edwards, master mechanic at the Ohio plant of the National Steel Co. at Youngstown, O., has resigned to accept a similar position with the Lake Superior Power Co. at Sault Ste. Marie, Ont. Before leaving for his new home Mr. Edwards was presented with a gold watch by the employes of the plant. Lincoln A. Treat has been appointed his successor.

W. H. Smith of Philadelphia, has been placed in charge of the structural department of the American Steel & Wire Co. at Neville Island, located in the Ohio river, below Pittsburg.

James W. Arrott, Jr., retiring manager of the foundry and enameling departments of the Standard Mfg. Co. of Pittsburg, was presented with a gold watch studded with diamonds, by the men under his supervision.

Joseph E. Schwab, brother of Charles M. Schwab, president of the United States Steel Corporation, has retired from the superintendency of the Duquesne steel plant of the Carnegie Steel Co., to become assistant to the president of the United States Steel Corporation. Mr. Schwab will be succeeded by Azor R. Hunt, superintendent of the plate mills at the Homestead Steel Works and assistant to A. C. Dinkey, superintendent at Homestead. Joseph E. Schwab will remove to New York about the middle of June to accept his new position. In 1883 he entered the employ of the Carnegie Steel Co. as draughtsman, and four years later he was transferred to Homestead as superintendent of the structural department. He remained at this work until five years ago when he was made superintendent of the Upper Union mills. He was later appointed superintendent of the Duquesne steel plant and blast furnaces. Azor R. Hunt entered the employ of the company about 15 years ago in the capacity of a mechanic. His first official position was that of superintendent of the 32-inch slabbing mill and he was later made superintendent of the 119-inch plate mill. As the plate mill capacity of the plant was increased Mr. Hunt's responsibilities increased until he became the superintendent of the largest plate mills in the world.

Superintendent A. C. Dinkey of the Homestead Steel Works of the Carnegie Steel Co., has made the following promotions: H. J. Schotter, now superintendent of the 48-inch mill, to succeed A. R. Hart as superintendent at Duquesne; W. H. Packer, appointed superintendent of the 48-inch mill, vice Schotter; William Whigham, superintendent of Howard Axle Works, vice J. B. Hardie, resigned. All of the men promoted have been employes of the Homestead Steel Works.

John D. Culbertson, treasurer, and E. H. Osborne, secretary and first assistant treasurer of the National Tube Co., have taken up headquarters in the Conestoga Bldg., Pittsburg with the other general officers of the company. They were formerly located in New York.

C. C. Jerome, president of the Jerome Metallic Packing Co., Chicago, died two weeks ago at Nauheim, Germany, whither he had gone for his health.

James R. Mills, Jr., Cleveland, sales agent of the Carnegie Steel Co., has been appointed also manager of sales for the Illinois Steel Co. in the same territory. W. H. D. Totten, Jr., representative of the Carnegie Steel Co. at Cincinnati, has likewise been appointed manager of sales for the Illinois Steel Co. in the Cincinnati district and N. D. Carpenter will represent both companies in Detroit.

Millard Hunsicker, who has represented the Carnegie Steel Co. abroad for several years, having headquarters in London, is now in this country to confer with officers of the United States Steel Corporation on the extension of its foreign trade.

F. H. Kindl has resigned as engineer of the Carnegie Steel Co. in charge of structural work, the change taking effect July 1.

A party of United States Steel Corporation officials arrived in Pittsburg Tuesday morning on a special train and are making a tour of inspection of some of the corporation's properties. The principal members of the party are four of the seven members of the executive committee, ex-Judge E. H. Gary, William Edenborn, Percival Roberts and E. C. Converse, and William Nelson Cromwell, counsel for J. P. Morgan & Co. Accompanying the party as guests of Judge Gary are Sir Windsor Richards and Arthur Keen, who came from England some weeks ago to visit steel plants in this country.

James McNaughton, one of the best known mine managers in the Lake Superior region and for several years past in charge of the Chapin mine at Iron Mountain, Mich., resigned to become general manager of the Calumet and Hecla mine.

Wallace H. Rowe, who has resigned as general manager of the Pittsburg district, American Steel & Wire Co., is succeeded by J. H. Price, formerly one of his two assistants. The other assistant, S. W. Tener, will fill the duties of both. Mr. Rowe will be the active manager of the Pittsburg Steel Co. which will build a bar and hoop mill at Monessen.

The formation of the firm of Shook & Fletcher, of Birmingham, Ala., is announced, the partners being P. G. Shook, formerly secretary and treasurer of the Alabama Steel & Ship Building Co. and assistant general superintendent of the steel works division of the Tennessee Coal, Iron & Railroad Co., and John F. Fletcher, Jr., formerly secretary and assistant treasurer of the latter company. On May 20 the new firm opened a brokerage office in Birmingham and will conduct a general commission business in pig iron, bar iron, steel, coke, coal, fire brick and other products. The firm also deals in boilers, engines, pumps, rolling mill machinery and other equipment.

The independent crucible steel project was chartered under the laws of Pennsylvania Monday of this week. The name is the Colonial Steel Co., of Moon township, Beaver county, Pa., and the capital stock is $1,000,000. The incorporators are James W. Brown, George A. Howe, T. Howe Childs, Charles M. Brown and Lewis H. Hayes. Besides these gentlemen, who comprised the principal stockholders of Howe, Brown & Co., which went into the Crucible Steel Co. of America, are a number of prominent Pittsburgers. A formal organization of the company will be effected this week. A complete crucible steel plant will be built at Monaca, 28 miles down the Ohio river on the P. & L. E. R. R., where land has been purchased.

The Carnegie Tube Co. was chartered in Pennsylvania this week with $150,000 capital stock, to manufacture tubes, the incorporators being Reed M. Vincent, W. H. Skivington, Harry E. Nicholls, John A. Scott, Bissell Everson and Oscar F. Grant, all of Pittsburg, and Archibald A. Hutchison, of Englewood, N. J. A site has been secured at West Carnegie, nine miles west of Pittsburg on the P. C. C. & St. L. road. The company will be organized the latter part of this week.

Heyl & Patterson, Pittsburg, have just purchased a plot of ground on Preble avenue, Allegheny, 239x264 feet, for $40,500, and will break ground within two weeks for a plant to make elevating machinery, lathes, etc., and do general construction work, as an addition to their present works on Water street, Pittsburg. The plant is expected to be completed in about five months.

Employes of the Youngstown, O., plant of the National Tube Co. have received an increase in wages ranging from 10 cents to 25 cents a day. Nearly 500 men are affected.

THE IRON TRADE REVIEW

Devoted to Machinery, Metal-Working and Foundry Trades and Iron and Steel Manufacture.

PUBLISHED EVERY THURSDAY BY

THE IRON AND STEEL PRESS CO.,

ROSE BUILDING, CLEVELAND, OHIO.

G. H. GARDNER, President and Treasurer.
JOHN A. PENTON, Vice-President.
A. I. FINDLEY, Secretary.

A. I. FINDLEY, EDITOR.

CHICAGO: 984 Monadnock Block, GEO. H. GRIFFITHS, Manager.
PITTSBURG: 429 Park Building, A. O. BACKERT, Manager.
NEW YORK: 150 Nassau St., D. C. WARREN, Eastern Manager.

Subscription, $3 per annum. To Foreign Countries, $4.00. Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

JUNE 6, 1901.

THE REAL ISSUE IN THE MACHINISTS' STRIKE.

The action of a meeting of machinery manufacturers at Chicago last week promises to become of far-reaching importance to that industry. The administrative council of the National Metal Trades Association, in conference with other representative men in the association made the pronouncement printed elsewhere in this issue and sent it out as the platform upon which they will conduct their business. A meeting of the entire association in New York on June 11, with other manufacturers who have not affiliated with it heretofore, is expected to confirm the work of the Chicago conference and give its declarations practical effect.

The meeting at Chicago has been referred to in the dispatches as marking the severance of relations between the National Metal Trades Association and the International Association of Machinists. The statement is scarcely correct. The final rupture came when the machinists' union violated the New York agreement by ordering strikes for increased wages in shops of the manufacturers' association, though the question at issue was plainly one which the union had agreed to arbitrate.

Now that the Metal Trades Association is absolved from its agreement with the machinists' union its growth promises to be rapid. Manufacturers who had been satisfied to watch the progress of relations between the two organizations before committing themselves, saw that the New York agreement, while it apparently involved mutual concessions, was effective in imposing upon the manufacturer responsibilities which increased his producing cost, but in practice gave him no compensating advantages. In other words, the machinists' union has been using the National Metal Trades Association to fight its battle for a 9-hour day, but has refused to keep the promises on which alone that concession was secured.

Officers of the machinists' union have been quoted as accepting the Chicago document as a declaration of war upon the union. The statement itself says that no quarrel is made with the proper functions of labor organizations. But the manufacturers have had experience enough to know that union control of a shop means that output will be restricted by decree, that the right of competent, self-respecting men to employment in such shop will be denied, unless they become members of the union, and that laws that are higher than the fiat of any manufacturer or any union will be set aside, to the narrowing of the manufacturer's opportunity and the hurt of the ambitious mechanic.

When men of brains, whose courage, insight, and executive ability have built up a prosperous business hand over the control of it to any man or set of men of small experience and limited opportunity, and with little knowledge of the economic status of the industry or the conditions surrounding it, disaster is bound to follow. It will be a pity if the English engineers' strike must be fought over in this country. When the machinists of the United States take advantage of the very prosperity economical production has brought to the country, to upset the basis on which the position of our manufacturers has been attained, they make a stupendous mistake.

Turn it in whatever way we will, and justify it on whatever plausible pretext, the demand of the union that it shall have control of the machine shops of the country simply means, in its nakedness, that the productive power of American machinery is to be artificially curbed. Instead of an increasing output, under the piece-price system, as new machines and the increased proficiency of the worker make it possible, the aim of the union is to maintain output at a fixed level. Such a position ignores all the factors of progress and arrogates to an organization of employes a wisdom that not all the economists in the world rolled in one could command. Productive power is not a stationary thing; it is the resultant of a thousand forces that are always at work and that cannot be suspended by the fiat of employers or men. As well try to dam Niagara as to set limits to human invention and ambition.

Questions of wages and hours may be arbitrated and ought to be, but the question of regulating shop output by union decree is no more arbitrable than the proposition to have the world stopped in its tracks.

There will be compromises and truces and here and there surrenders of principle, in the adjustment of the machinists' strike. But there will be no peace and certainly no long continued prosperity for American machinery manufacturers if the demand that they put their shops under the control of the International Association of Machinists is generally enforced.

The splendid building prospect is one of the best guarantees of continued prosperity throughout 1901. The *Construction News* gives the total cost of buildings planned for 1901 in 21 cities as $57,857,000 as against $18,769,000 in 1900. Of the increase of $39,000,000, or more than 200 per cent, about $30,000,000 is in New York City. Much of the New York building is said to be due to a new law on which plans were anticipated to the extent of a year's building, but the increase in the other cities is pronounced enough to account for no small fraction of the present consumption of iron and steel. What with the railroad prosperity, the large buying by agricultural implement works, the activity

of the shipyards, and the excellent building record referred to above, 1901 promises to go down as the banner year in iron and steel; and this with the export trade in iron and steel steadily dwindling, as prices abroad have fallen very sharply within the past six months.

IMPORTANT CONVENTION OF MACHINERY MANUFACTURERS.

First in importance of the developments of the week affecting the machine shop situation is the convention of manufacturers to be held in New York on Tuesday, June 11. It will be attended by members of the National Metal Trades' Association and by many manufacturers who have not affiliated with that organization heretofore, but have decided, in view of the events of the past week, to join with others in making a strong, united association tha shall conserve the interests of the manufacturer under existing conditions. This meeting is expected to take action on the declaration of principles adopted at Chicago last week by the administrative council of the National Metal Trades Association, as printed below.

After the efforts of the Chicago conference to arbitrate the differences between the Chicago machinists and their employers had failed the following preamble and resolution were adopted by the administrative council on Tuesday, May 28:

"WHEREAS, The National Metal Trades Association and the International Association of Machinists formally entered into an agreement on May 18th, 1900, for the express purpose of avoiding strikes and lockouts by arbitrating all disputes between employers and employes; and

"WHEREAS, It was specifically agreed that pending arbitration there should be no strikes or lockouts; and

"WHEREAS, In direct violation of that agreement, the I. A. of M. has refused arbitration and has officially ordered and instituted strikes in many shops of the members of the N. M. T. A., be it

"*Resolved*, by the Administrative Council in session in Chicago on this, the 28th day of May, 1901, that the International Association of Machinists has wilfully violated its agreement of May 18th, 1900, and having made the same null and void, the agreement is no longer binding on the National Metal Trades Association."

Already responses have come from all quarters of the country, and the New York meeting promises to be the largest and most important in the history of the National Metal Trades' Association. It is the expectation and desire of the officers of the association that all the local associations, like those at Kansas City, Minneapolis, Milwaukee, Cleveland, Cincinnati, Columbus, Buffalo, Dayton, Springfield, O., and in various centers of New England, send delegates. The purpose is to get the consensus of manufacturers in all parts of the country on the questions that are now uppermost.

Reports from various centers indicate that none of the members of local associations of employers have made any concessions since last week. The manufacturers have taken a very firm stand against the unjust method adopted by the leaders of the machinists' union. The indications are that many of the employes, when they discover that they have misjudged the situation and, as in many cases, that they have been misled as to the terms on which many settlements have been made, will see their own interest in the matter and come to an understanding with their employes. So far as the International Association of Machinists is concerned, it has thrown away one of the best opportunities ever given to a labor union to secure direct benefits for its membership. Its violation of the New York agreement has undone the work of months and has set the cause of legitimate unionism back for years.

Action of Chicago Manufacturers.

CHICAGO, June 4.—The Chicago Association of Machinery Manufacturers, which comprises in its membership 71 of the leading concerns of this city, many of whom are also members of the National Metal Trades' Association, have agreed to stand by the action of the National Metal Trades' Association, and to throw their influence and weight with that body in its effort to bring about a satisfactory solution of the labor difficulties. At a meeting of the association this afternoon, the following resolution was unanimously adopted:

"WHEREAS, at a recent meeting of the National Metal Trades' Association in Chicago, the local arbitration committee, members of the National Metal Trades' Association, met with an arbitration committee representing the International Association of Machinists, and failing to come to an agreement, adjourned.

"Now, therefore, we, the machinery manufacturers of Chicago, hereby pledge ourselves to stand by the action of the National Metal Trades' Association in their refusal to grant 12½ per cent advance in wages and agree to wait the results of the meeting of the National Metal Trades' Association to be held in New York City, June 11 next, and pending such meeting, we will make no concessions in Chicago in the wage scale existing in our factories."

The association also appointed four members to attend the meeting of the National Metal Trades' Association in New York, and explain to that body the local situation and the position of their association. These delegates are W. J. Chalmers of the Allis-Chalmers Co., J. J. Walser of the Goss Printing Press Co., Mr. Pearson of the Pearson Machine Co., and H. W. Egan of the F. W. Wolf Co.

It was agreed also that members of the association can operate their plants under the old arrangement, pending action at the New York meeting. It is estimated that from 1,400 to 1,800 Chicago machinists are now out.

Declaration of Principles.

The following platform, adopted by the Administrative Council at its Chicago meeting, sets forth the position of the machine shop proprietors and embodies the basis on which they will operate their plants:

"We, the members of the National Metal Trades' Association, declare the following to be our principles, which shall govern us in our relations with our employes:

"Since we, as employers, are responsible for the work turned out by our workmen, we must therefore have full discretion to designate the men we consider competent to perform the work and to determine the conditions under which that work shall be prosecuted. The question of competency of the men being determined solely by us, and while disavowing any intention to interfere with the proper functions of labor organizations, we will not admit of any interference with the management of our business.

"Disapproving absolutely of strikes and lockouts, the members of this association will not arbitrate any question with men on strike. Neither will this association countenance a lockout on any arbitrable question unless arbitration has failed.

"Employment.—No discrimination will be made against any member of any society or organization. Every workman who elects to work in a shop will be required to work peaceably and harmoniously with all his fellow employes.

"Apprentices, helpers and handy men.—The number of apprentices, helpers and handy men to be employed will be determined solely by the employer.

"Methods and wages.—We will not permit employes to place any restriction on the management, methods or production of our shops, and will require a fair day's work for a fair day's pay.

"Employes will be paid by the hourly rate, by premium system, piece work or contract, as the employer may elect.

"It is the privilege of the employe to leave our employ whenever he sees fit, and it is the privilege of the employer to discharge any workman when he sees fit.

"The above principles being absolutely essential to the successful conduct of our business, they are not subject to arbitration.

"In case of disagreement concerning matters not covered by the foregoing declaration, we advise our members to meet their employes either individually or collectively, and endeavor to adjust the difficulty on a fair and equitable basis. In case of inability to reach a satisfactory adjustment, we advise that they submit the question to arbitration by a board composed of six persons, three to be chosen by the employe or employes. In order to receive the benefits of arbitration the employe or employes must continue in the service and under the orders of the employer, pending a decision. In case any member refuses to comply with this recommendation he shall be denied the support of this association unless it shall approve the action of said member.

"Hours and wages.—Hours and wages being governed by local conditions shall be arranged by the local associations in each district. In the operation of piece work, premium plan or contract now in force or to be extended or established in the future, this association will not countenance any conditions of wage which are not just, or which will not allow a workman of average efficiency to earn at least a fair wage."

The American Society of Mechanical Engineers.

In our last issue we reported in brief the proceedings of the American Society of Mechanical Engineers at Milwaukee up to noon of Wednesday, May 29. The discussion of the paper on "Blue Printing by Electric Light," by H. G. Reist, General Electric Co., Schenectady, N. Y., was interesting and animated.

Mr. Knox—I would say that it is absolutely necessary to make the inside of the frame of enamel paint. You must not have it too bright. One of our men tried to make a bright frame inside, and the result was that one part of the tracing was reflected back on other parts, and the print when taken out, was a most extraordinary looking blue print, the drawing number appearing in half a dozen different places. So you see it must be a dead color. We are arranging to do all of our blue printing by electric light, even though the sun is shining bright, because we find that we can do it cheaper than we can by pushing the frames outside and tilting them to the sun and then dragging them inside again. With the new process, the frames do not have to be handled. In the old way, the limit of our blue print production was in the ability and strength of the boys to handle these frames. It took only thirty seconds to make a blue print, but it took seven or eight minutes' time to get the frame out in place, and as much more time to get it back. With this electric light blue printing, you do not need to move your frame at all. Another important thing is this: Nobody thinks of sending out a letter on a business matter without keeping a copy of it, but frequently we have had to send out drawings in answer to a telegram, and to make up at 5 o'clock a drawing and send out, or late in the afternoon on a rainy day when we couldn't make a copy of it, and the result was that we were sending away a great many sketches which we were afterwards obliged to ask the recipient to send back to us.

Mr. Thomas—The cost of installing this electric light apparatus is between $400 and $500, if I am not mistaken.

C. W. Hunt—We have been using this apparatus very successfully. It is very convenient now. There is no frame to handle, no glass to touch. It is a cylinder and a piece of canvas that is raised out and the drawing slipped in. It is very easy and very quick. After we got it, we abandoned sun printing entirely.

President Wellman—In connection with our experience, I think the cost of the apparatus was somewhere between $200 and $300, but the saving for the whole system paid for it in less than three months, and one boy did all the work, whereas, in the other case, we kept two or three at work and then only made a small portion of our blue prints. We had to go outside and hire some of them made.

H. Sawyer—I would like to ask any of the gentlemen who have had experience with this apparatus, if there is any trouble by excessive heating of the glass. I am led to ask the question from information I got in visiting a large engineering plant at Philadelphia, where they had this blue printing arrangement. They set the glass there for printing vertically, and the lights were perhaps 20 feet away from it. They explained to me that they all had a great deal of trouble on account of the heating of the glass, and they thought some other arrangement would secure a better use of the light and less heat. It is a question in my mind whether the loss of heat and the reflection of light are not about the same and if any arrangement would not concentrate the heat upon the glass in about the same proportion.

Mr. Hunt—There is no difficulty with the heat whatever. There is a switch arranged convenient to the operator, so that to protect his own eyes, he immediately turns it off when the paper is printed. And so the light is only running when they are taking the print.

Mr. Reist—The glass that I described in my paper is arranged in this way. There is a ventilator arranged in the top of the device, which acts as a chimney and keeps drawing in cold air from the room; and besides the light is always turned off immediately after the printing is completed

The President—We have had no trouble with heating at all. We have had the apparatus in use something like a year and a half, and there have been no breakages and no trouble with it whatever.

Mr. Knox—It is not claimed that it is better than the cylinder, but the outfit costs probably 1-15 of the cylinder apparatus. It does print just as quickly as the cylinder.

C. W. Hunt, of New York, presented his paper on a "New Connecting Rod End," which was to have been read Thursday morning. The hour of adjournment being near at the conclusion of the reading, it was decided to hold this subject over for discussion until the following day.

THURSDAY MORNING.

President Wellman called the meeting to order at 10:30, and the preliminary report of the committee on standardization of methods of making engine tests was read. This brought out an interesting discussion, W. W. Christie, consulting engineer, Paterson, N. J.; Prof. H. Wade Hibbard, Cornell University, Ithaca, N. Y.; Prof. R. H. Thurston, Cornell University, Ithaca, N. Y., and Mr. Cederholm, of Fraser & Chalmers, participating. Mr. Hunt moved that blanks suitable for practicable use in testing and filing afterwards as permanent records be printed and distributed among the members, and the motion carried.

The report of the committee on standardization of engines and dynamos was read by James B. Stanwood, of Cincinnati. The committee stated that a number of manufacturers had agreed to change their practice in conformity with the recommendations suggested. Much interest was evinced in this report, and it was quite freely discussed.

A. J. Rossi, author of the paper on the "Influence of Titanium on the Properties of Cast Iron and Steel," was called upon to answer some questions. He stated that he had made experiments with the assistance of Dr. Moldenke, secretary of the American Foundrymen's Association, in which they had used mixtures containing from 1 to 4 per cent of a 12 per cent titanium alloy of iron. In cast iron it had been found that a 4 per cent addition of a 10 to 12 per cent titanium alloy increased both the transverse and tensile strength of cast iron about 20 per cent.

In the slight discussion that followed Mr. Rossi's remarks, Mr. Wellman stated that it had been conceded by all metallurgists that titanium was about the worst devil that afflicted iron ores and that no blast furnaceman would take ore containing it at any price, and that if titanium was discovered in the ore, all the troubles of the blast furnace were ascribed to it. He admitted the value of titanium as an alloy and also that it was going to play a very important role as a hardener of steel, but he said that if Mr. Rossi could tell the metallurgists how they could get rid of the titanium in great quantities of Canadian ores that contained large and small percentages of it, so that they could make a commercial iron for every day use, he had no doubt he had a very valuable thing. Mr. Rossi had samples or ores and finished articles made from titanic ores which he showed the members.

The paper of William E. Reed of Warner & Swasey, Cleveland, on "A Few Instruments of Precision at the Paris Exposition," was read, which was followed by the paper, "Bevel Gear Cutting Machines at Paris," by Fred J. Miller, editor of the *American Machinist*.

Professor Storm Bull read an abstract of his paper on "The Locomotive Exhibits at the Paris Exposition," which was succeeded by the paper on "Method of Filing and Indexing Engineering Literature, Notes, Data, etc.," by George H. Marr, of Hollingsworth & Whitney Co., Waterville, Me. A short discussion followed, in which Prof. Breckenridge, of the University of Illinois, suggested that a standard method be adopted by the society.

FRIDAY MORNING.

The papers read at this session were the following: "A Filtration Plant at Albany, N. Y.," by William O. Webber, Boston, Mass.; "Tests of an Hydraulic Air Compressor," by William O. Webber, Boston, Mass.; "The Bardwell Votometer," by Bardwell and Hamilton; "Some Experiments on Ball Bearings," by Charles H. Benjamin, of the Case School of

[Continued on Page 33.]

GREEN SAND CORES.*

BY P. R. RAMP, AURORA, ILL.

This subject bears directly on the foundry business and is one of the important features in molding. A green sand core is a core constructed from the same material used to make a green sand mold. It is not dried in an oven but placed in the mold as soon as completed, thereby saving the fuel that is necessary to fire the core oven when dry sand cores are used. In making light castings the green sand core has an advantage over any other core because it overcomes the rough and irregular joints that are often found where a dried core and a portion of the mold come in contact with each other. In cases where a large core is nearly completely surrounded by a thin casting the green core is the best also. If a dried core is used there is always a liability of the heat from the casting causing the material in the dried core to expand and thus break the casting. Another advantage is when cleaning castings a very large dry sand core requires considerable time and labor to dig out of the casting; if a green sand core is used all that is required is to rap the casting in order to remove the sand.

Green sand cores can be used to advantage in the production of plumbers' ware, i. e., soil pipe, elbows, tees, etc. Also locomotive smoke stacks, railroad oil boxes, and similar castings. These cores cannot be made strong enough to be handled without some kind of a support. An arbor usually made of cast iron, often of wood, is used to carry them.

In making a green sand core for a locomotive smoke stack the proper rig would be a cast iron core barrel 1 inch thick, the shape of the cored portion of the stack, allowing only about 1 inch for sand between the barrel and the inside of the stack. The barrel must be cored with prickers about 1½ inches long by ½ inch in diameter, tapering to a point, in order to carry the sand. There should be equally as many ½-in. holes in the barrel to allow the gas to escape freely. Both ends of the barrel should be turned off to suit the ends of the flask the mold is made in. The core is formed by setting the barrel on two wooden horses with iron bearings attached to them for the spindle of the barrel to rest in. The sand is now pressed between the prickers and a strike of the proper shape is placed on the wooden horses the right distance from the barrel, a crank is used to turn the barrel as fast as the sand is pressed between the prickers. In this manner a stack of any thickness may be made from one core-barrel. As soon as the mold is poured and the casting is cool enough a chain is hooked on to the end of the barrel and the barrel and casting are hoisted to a vertical position. A little rapping on the casting will cause the sand between the core-barrel and the casting to run out and relieve the stack which will drop off of the barrel. In this case a dried core would make a very poor job. Not only would it cost more to make the core and furnish the material, but, as stated before, the expansion of the material would break the casting because the generally averages about 3-16 inch thick.

Core barrels for soil pipe cores are made on the same principle instead of prickers, however depressions are made in the barrel. Where it is not possible to use a core barrel arbor and anchor, lifting plates are used. Often the arbor must be made in sections to enable the moulder to get it out of the casting after the mould is poured. Lifting plates are generally made with threads for lifting screws to make it possible to take the screws out after the green sand core is placed in its position in the mould. There is considerable core sand and labor saved in making railroad oil boxes with a green sand core. In this case an arbor made in sections is used, the shape and number of sections depending entirely on the size and shape of the oil box.

There are many small dry sand cores (such as cores forming round and square holes of different sizes) used that could be made in green sand much cheaper. On of the reasons they are not made in green sand is because the pattern maker, as a rule, carries a stock of core prints of different sized round and square cores. He, knowing there are core boxes for the different sized cores in the foundry, finds it much less trouble to tack on several small ready-made prints than to finish out several holes the same size so they will leave the sand properly. As a result the foundry foreman is disgusted to find that he is compelled to make a lot of small dry sand cores, say 1 inch by 1½ inches, that could just as well be made in green sand. There is, without a doubt, quite a sum of money spent every year for labor and material to make dry sand cores that could just as well be saved or put to some better use. So it is with the dry sand cores we often find foundrymen worrying along with a job trying to use green sand cores where a dry sand would be the cheaper. To be able to judge which of the two kinds of cores is the better and cheaper to use in making any certain job, we must have practical experience in the business. For instance, in case of the smoke stack a dry sand core would not be practical, neither would a green sand core for the steam ports or bore of a Corliss cylinder be a success.

Green sand cores are not good for making bulky castings where there is a heavy pressure of metal. One reason is because it is not possible to make a green sand core hard enough to withstand as great a pressure as a dry sand core will stand without a cut or scab. Another point in favor of the dry sand core is when it is placed in the mold, say an oil box, if it does not give the proper metal on all sides by reason of it not being placed in properly, it can be taken out and reset, whereas, in case of the green sand core it is very risky business to remove it after it has been placed in the mold.

So I say in conclusion that in making light castings there are many cases where the green sand core can be used to a decided advantage. On the other hand there are cases where the dry sand core is the better. I am a little inclined to favor the dry sand core except in cases as mentioned above, because I think the dried core is the safest and in making castings of any great size that must free from dirt, etc. I have always found it cheaper to make a dry sand mold. Many foundries do not favor dry sand cores. Often it is because the core sand they are using is not what it should be. In making cores for locomotive and Corliss engine castings I use for my core sand mixture about 6 parts heavy molding sand and 4 parts sharp building sand. If my castings do not clean very well or show dirt I add a little more sharp sand. Many foundrymen worry about the blacking. My experience has been, if I used a good open sand and have vented the core of mold well, and had it thoroughly dry, a fair grade of blacking always did the work as well as a more expensive grade.

The foundry supply men often speak of the different foundries that use their blacking. I always think, "Well, no matter how good the blacking if there is not a good open sand behind it."

We often find cases where the blacking on the dry sand mold or core has washed off in flakes before the iron while it was being cast. One of the old established remedies for this trouble is molasses-water. This does some good, but I feel satisfied that a little more coarse sand in the mixture would be of more benefit.

*Read at the Buffalo meeting June 4-6) of the American Foundrymen's Association.

A number of mills at Youngstown, O., had trouble last week from the breaking of machinery and there were shut-downs from 24 hours to two or three days. The Bessemer plant of the Republic Iron & Steel Co. was off for about a day owing to a broken table shaft. The breaking of a ladle crane cylinder caused a shut-down at the Ohio plant of the National Steel Co., while the 16-inch mill at the Valley Works was off on account of a broken engine.

The boiler makers employed by Struthers, Wells & Co. at Warren, O., went on a strike last week and the molders followed in sympathy. The employment of non-union men is the cause of the trouble. About 200 men are affected.

The Aurora Furnace of the Susquehanna Iron & Steel Co. at Wrightsville, Pa., was put into blast last week. The furnace has been idle for more than a year. A large amount of stock which had been carried has been disposed of and the indications are that the furnace will be operated steadily for an extended period.

THE STEAM COACH IN 1825.

BY ROBERT L. CLEGG.

The accompanying illustrations are reproduced from the *American Mechanics' Magazine*, a journal published in New York City during the early part of the last century. On the 17th of December, 1825, this magazine reprinted an article from the *Edinburgh Philosophical Journal*. It is, of course, important to fix the date of original publication as far as possible.

This particular issue of the *Mechanics' Magazine* is especially noteworthy inasmuch as it contains a detailed account

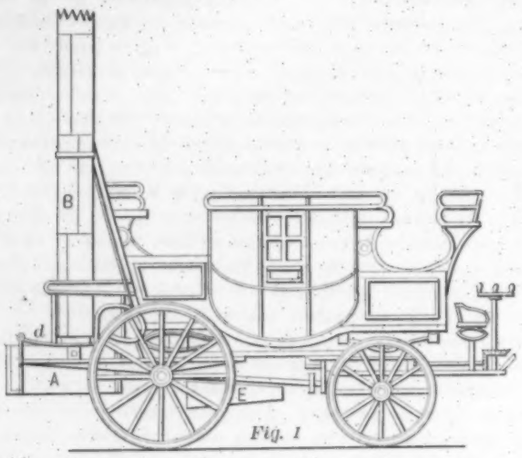


Fig. 1

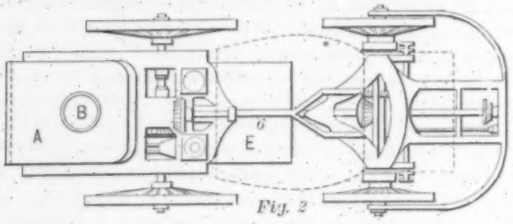


Fig. 2

of one of the earliest attempts at a solution of the several problems incidental to the construction of a practical road-vehicle of the self-propelled type. Earlier attempts had been made in England with a marked degree of success. In France Cugnot, and in this country Fulton had applied steam to the road propulsion of rude trucks; but I am not aware of any earlier and equally detailed description of an actual working automobile in which the inventors have contemplated just such contingencies as even now, in the 20th century, we are prone to suppose are exclusively for our present-day consideration and settlement. The article is here reproduced and tells its own story, not only as regards the inventive skill of its designers, but also the state of the art at that distant date. Following the article I shall point out some features suggested by the engravings and in continuation of the position stated in the preceding paragraph:

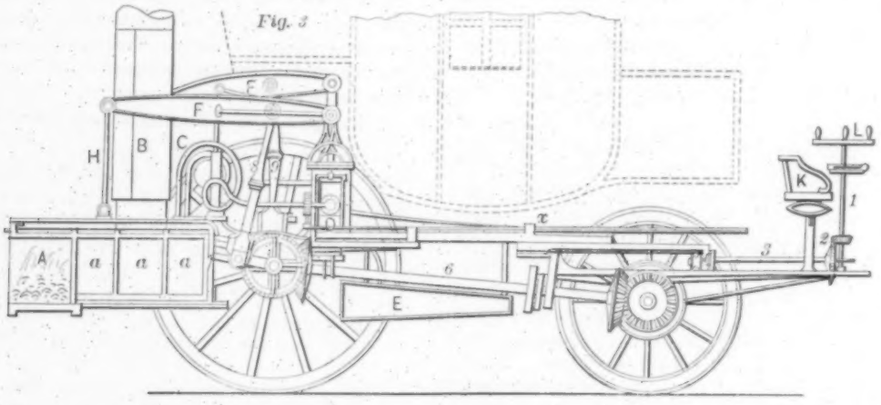
"Among the many and varied improvements of the present age, we have the pleasure of presenting the readers of the *American Mechanics' Magazine* with the plans and description of one calculated at no distant period, to produce a considerable change in the manner of transporting travellers, merchandise and produce by land from one place to another with the greatest expedition and with the smallest expense. The new patent steam carriage, invented by Burstall and Hill, engineers, of England, has been found sufficiently light and powerful to propel itself with considerable force on a level, and with a degree of power sufficient to surmount the hills of any common road. May not this power work as great a change in our land as it has in our water conveyance? We give the description as published in the last issue of the *Edinburgh Philosophical Journal*, together with the numerous explanatory cuts.

"The invention of a locomotive steam carriage consists in the combination and employment of principles, some of which are new in their application to this purpose, and others well known and in general use. The leading features of the invention may be comprehended under the following heads: 1. The arrangement of machinery, and certain pieces of mechanism, adapted to effect the necessary evolutions of a locomotive carriage. 2. The novel construction of a boiler or generator for the production of steam, and the peculiar kind of pipe or curved passage for conducting the steam to the engine. 3. The mode of supplying the boiler with water, by means of pneumatic pressure, as exhibited in the plans and sections.

"Fig. 1 represents a side elevation of the coach, with the body, etc. Fig. 2 is a ground plan. Fig. 3 is a section, on an enlarged scale, of the boiler and machinery. Fig. 4 exhibits the top of the boiler, with the feed-pipe, and receptacles for water, as will be afterwards explained; the dotted lines in this figure show the fireplace and flues, the arrow being in the direction of the flame to the chimney. Figs. 5, 6, 7, 8, 9, 10 are plans and sections of several parts of the machinery with different modifications. Fig. 11 a plan of the ratchet box and part of the nave. Fig. 12 is a top view of a plate fixed on the spindle of the steering wheel, to indicate to the conductor the angle of obliquity of the two axles. The same letter and figures refer to the same parts of all the plans.

"A represents the boiler, which is formed of a stout cast iron or other suitable metal flue, incased in a wrought iron or copper case, as seen in section at Fig. 3, where A is the place for fuel, and a a a are parts of the flue, as seen in section. The top is formed, as in Fig. 4, into a number of shallow trays or receptacles for containing a small quantity of water in a state of being converted into steam, which is admitted from the reservoir by the small pipe g g, while b b b is the

Fig. 3



outer wrought metal case containing the steam for the use of the engine. B is the chimney, arising from the center flue.

"D D are the two cylinders, which are fitted up with pistons and valves, or cocks, in the usual way, for the alternate action of steam above and below the pistons. The boiler being suspended on springs d the steam is conveyed from it to the engines through the helical pipe o, which has that form given to it to allow the vibration of the boiler without injury to the steam joints.

"F is the cistern, containing water for one stage, say 50 to 80 gallons, and is made of strong copper, and air tight, to sus-

tain a pressure of about 60 pounds to the square inch. By e is denoted one or more air-pumps, which are worked by the beams of the engines, and are used to force air into the water vessels, that its pressure may drive out by a convenient pipe the water into the boiler at such times and in such quantities as may be wanted.

"F F are two beams connected at one end with the piston rods, and at the other with the rocking standards H H. At about one-fourth of the length of the beams from the piston rods are two connecting rods g g, their lower ends being attached to two cranks, formed at angles of 90 degrees from each other on the hind axle, giving by the action of the steam a continued rotatory motion of the wheels without the necessity of a fly-wheel. The four coach wheels are attached to the axles nearly as in common coaches, except that there is a ratchet wheel formed on the back part of the nave, with a box

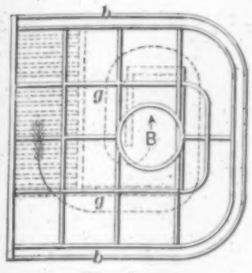


Fig. 4

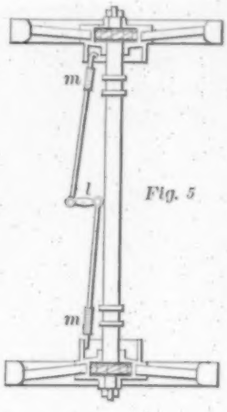


Fig. 5

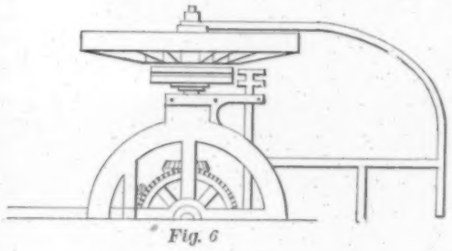


Fig. 6

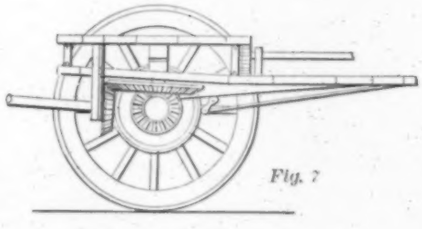


Fig. 7

wedged into the axle containing a dog or pawl, with a spring on the back of it for the purpose of causing the wheels to be impelled when the axle revolves, and at the same time allowing the outer wheel when the carriage describes a curve to travel faster than the inner one and still be ready to receive the impulse of the engine as soon as it comes to a straight course. The box and pawl are shown separate at 11.

"Figs. 5, 8, 9 and 10 show a different method of performing the same operation, with the further advantage of backing the coach when the engines are reversed. In this plan the naves are cast with a recess in the middle, in which is a double bevel clutch, the inside of the nave being formed to correspond. The clutches are simultaneously acted upon by the rods and small lever b, with the helical springs m m, which, according as they are forced to the right or left, will enable the carriage to be moved forward or backward. To the fore naves are fixed two cylindrical metal rings around which are two friction bands, to be tightened by a lever convenient for the foot of the conductor, and which will readily retard or stop the coach when descending hills. K is the seat of the conductor, with the steering wheel L in front, which is fast on the small upright shaft, 1, and turns the two bevel pinions, 2, and the shaft 3, with its small pinion, 4, which working into a rack on the segment of a circle on the fore carriage give full power to place the two axles at any angle necessary for causing the carriage to turn on the road, the center of motion being the perch pin.

"The fore and hind carriage are connected together by the perch, 5, which is bolted fast at one end by the fork, as seen at Fig. 2, and at the other end is secured by two collars, which permit the fore and hind wheels to adapt themselves to the twist of the road.

"To ascend steep parts of the road, and particularly when the carriage is used on railways, or to drag another behind it, greater friction will be required on the road than the two hind wheels will give and there is therefore a contrivance to turn all the four wheels. This is done by the pair of mitre-wheels, 4, one being on the hind axle, and the other on the longitudinal shaft, 6, on which shaft is a universal joint directly under the perch pin at 7. This enables the small shaft 7 to be turned, though the carriage should be on the lock. On one end of the shaft 7 is one of a pair of bevel wheels, the other being on the fore axle, which wheels are in the same proportion to one another as the fore and hind wheels of the carriage are, and this causes their circumference to travel on the ground at the same speed.

"Fig. 6 is a ground plan and Fig. 7 a section of another way of impelling all the wheels together, where the perch pin is over the center of the axle. The wheel 8 is turned upon it, which being put in motion by the wheel 9 will cause it by means of the wheel 10 to turn the fore axle and thereby the wheels. There are safety-valves and cocks to admit, shut off,

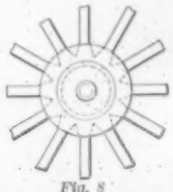


Fig. 8

Fig. 11

Fig. 10

Fig. 9

Fig. 12

and regulate the steam, etc. But as the engraving is necessarily on a small scale, and such things are familiar to mechanicians, we have thought it unnecessary to cumber our account with them.

"It is only remains for us to say that the object of the patentee is, in the peculiar construction of a boiler, to make it a source of calorie; they proposing to heat it from 250 to 600 or 800 degrees Fahrenheit; and by keeping the water in a separate vessel and only applying it to the boiler when steam is wanted they accomplish that great desideratum in the application of steam to the common roads, of making just such a quantity of steam as is wanted: so that when going down hill where the gravitating force will be enough to impel the carriage all the heat and steam may be saved, to be accumulating and given out at the first hill or bad piece or road, when, more being required, more will be expended.

"The engines are what are termed high pressure and capable of working to ten horse-power, and the steam is proposed to be let off into an intermediate vessel that the sound emitted may be regulated by one or more cocks."

Modern Automobile Problems Anticipated.

Thus far goes the description in the old-time publication and it will be noted that in some respects the inventors appear to have realized certain conditions not always heeded in modern productions of this type. For instance, a well-known English engineer, Mr. Booth of London, about a year ago called attention to the shortcomings of European designers of automobiles. He pointed out at length the positive need of guards for the front and the leading wheels of automobiles and concludes with the statement that the neglect to make such provision is "a serious omission and evidence of paucity

of thought and lack of consideration for the public safety." In the same article he directed attention to the misunderstanding prevalent in regard to the power of the horse and the too frequent assumption that a two-horse vehicle is no more than equal to a two-horse motor. It is not claimed that the new steam coach fully meets this need, but Fig. 2 shows a protecting strip carried around the front of the coach as far as the hubs of the leading wheels; and from the description it will be noted that ten-horse power was provided.

The boiler is suspended by springs and this calls for a more or less flexible connection of the steam and feed-water pipes to the cylinder and tank. The manner in which this is accomplished is shown in Figs. 1 and 3, and consists in making the pipes in the form of a helix.

It is a curious fact that this coiling of the connecting pipes on an automobile, to better resist the pernicious effects of vibration, is covered very closely by a United States patent of comparatively recent date. In patent 639,490, issued December 19, 1899, the following is claimed:

"In a vehicle, the combination of a reservoir and a burner or generator mounted upon said vehicle and adapted to oscillate with respect to each other, of a continuous laterally-flexible coiled piping intervening between the said burner or generator and united to the said reservoir and burner or generator by rigid joints."

I do not doubt that the interest aroused in automobile matters during the past few years has occasioned many other discoveries of the already discovered, and that is another reason why the work of these pioneers in engineering deserves to be better known.

The application of the power directly to each of the four wheels has also received considerable attention during the past year or so and sundry patents have been allowed on this line. Briefly these may be divided into two classes, the Ballard and the Saunier types. In the former the leading axle is capable of turning around a central pivot, or king-bolt, as in an ordinary horse-drawn vehicle: a bevel gear is mounted concentrically with the pivot and acts as an intermediate, the intermediate is driven from the rear axle or any other convenient source and in turn drives a differential gear operating the leading wheels. Of course this last may be accomplished by the axle being divided and rigidly attached to the wheels or by having the wheels turn on the axles and be driven through gears fastened to the hubs or spokes as may be considered best by the designer. M. Baudry de Saunier has invented a form of steering and driving the leading axle in cases where the wheels are to rotate on short axles pivoted close to the hubs. In order that the wheels may be driven and at the same time the axis of either wheel may stand at various angles with the main axle, a universal joint, similar to those in use on the milling machines for conveying power to the platen, is necessary; and M. Saunier uses a sort of claw-clutch consisting of bevel gears, the face of each tooth being part of the surface of a sphere. When the carriage is going ahead the inner part of each tooth in the two halves of the clutch is in contact, but when the wheels are turned, as in going around a curve, then the contact gets to the outer and thicker part of the teeth as is required for the greater strain. In both these plans the use of the differential gear is advisable, but the builders of the new steam coach were not, I fear, aware of that contrivance and their method is all the more interesting. By the way, it is a moot question as to when the jack-in-the-box made its appearance amongst gears. The English, I believe, claim Houldsworth as the inventor, and Mr. Webber has given some attention to placing the credit on this side of the Atlantic, whilst M. Louis Lockert claims the honor for Pecquer and assigns the time to 1826.

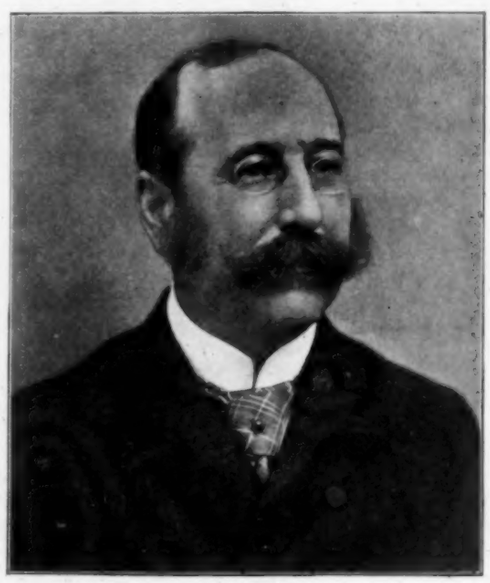
Quite a warm discussion has waged in regard to the relative advantages of wheel or lever steerings; the former being most in vogue on the Continent. Without going into this matter, it may be said in general that one of the merits of the lever is that of indicating at once to the operator the direction of the leading wheels. The tiller-wheel does not so readily show this feature, and this, too, is anticipated and provided against in the dial and pointer of Fig. 12.

There are other points which will be apparent to those interested in the development of the automobile industry: the boiler which has a strong family likeness in the description at least to some suggested flash-generators for the same purpose at the present time; the muffler to soften the sound of the issuing exhaust steam, etc.; and among the good qualities sought by the ingenious designers one seems to have been fairly attained in the view of such matters taken by a prominent inventor. At any rate I venture to apply to it a quotation from the much-discussed Selden patent, to the effect that it "is so designed as to leave the body or platform of the carriage practically unobstructed for the conveyance of passengers or freight except for the handles or wheels necessary for the guidance or controlling of the vehicle and the regulation of the engine."

The ability exhibited in its construction availed nothing against the dual opposition of the landed interests and the progress of railroading; and the lessons of the builders were forgotten. How closely applicable they were to present-day problems in automobilism will be evidenced by a study of the new steam coach as here given.

THE LATE GILBERT M. M'CAULEY.

The death of Gilbert Martin McCauley of Harrisburg, Pa., removes a prominent member of the Eastern iron trade—a man of influence in his home city and in the industry with which he had long been identified. Mr. McCauley returned but recently from a California trip and with his wife was visiting in Philadelphia. A sudden attack of heart trouble at the Pennsylvania depot caused his death. He was born at Ashland, O., Jan. 31, 1842, and took his common school and high school courses there. He was assistant postmaster at Ashland for a time and was a clerk in the First National bank at Ashland when the war broke out. He at once enlisted in the Twenty-third Ohio Infantry, the regiment of which ex-President Hayes was colonel and President McKinley a major. He was soon transferred to the Quartermaster's Department and located in Harrisburg. He remained in the



service until the close of the war, when he was tendered and accepted a position in the First National bank of Harrisburg. In 1875 he became identified with the Central Iron Works, and later, through regular promotions, became general manager and treasurer of the Central Iron & Steel Co. when the Bailey and McCormick interests were merged in that corporation. He was closely associated with the late Charles L. Bailey and had much to do with the developing of the extensive plant with which he was connected. He was president of the Harrisburg board of trade for a time, and president of the Association of American Steel Manufacturers which was organized a few years ago to secure uniformity in the specifications of plates and structural steel. He had been president of the Harrisburg Foundry & Machine Works and was a director of the Harrisburg Trust Co. As a type of the business man who

is large-hearted, sincere and thoroughly interested in the betterment of conditions in all walks of life. Mr. McCauley will be remembered by a wide circle of friends in the business world. His relations with employes were such as to give him their respect and confidence.

The Cobb & Drew wire mill, located at Sterling, Ill., commenced operations last week with nine blocks. A warehouse 80x108 feet is to be erected.

The new rail mill which the Tennessee Coal, Iron & Railroad Co. is installing at Ensley, Ala., will probably commence operations in about a month. The big engine, built by the E. P. Allis Co. of Milwaukee, Wis., is already in place and will be tested within a few days. Much of the machinery for the mill is already in place and there is every indication that the mill will be in operation in July. Officials of the company have stated that sufficient orders have been booked to keep the mill in full operation for three months at least.

The Jones Valley, Ala., Iron Co. has been declared a bankrupt in the United States court. The petition alleged that the company had committed an act of bankruptcy in that it had transferred a large amount of ore, worth $6,000, to Rogers, Brown & Co., with intent to prefer them to other creditors. It was also alleged that the firm was insolvent and owed $4,000 to its employes in addition to other debts.

The Sloss-Sheffield Iron & Steel Co. will blow in its second furnace at Sheffield, Ala., this week.

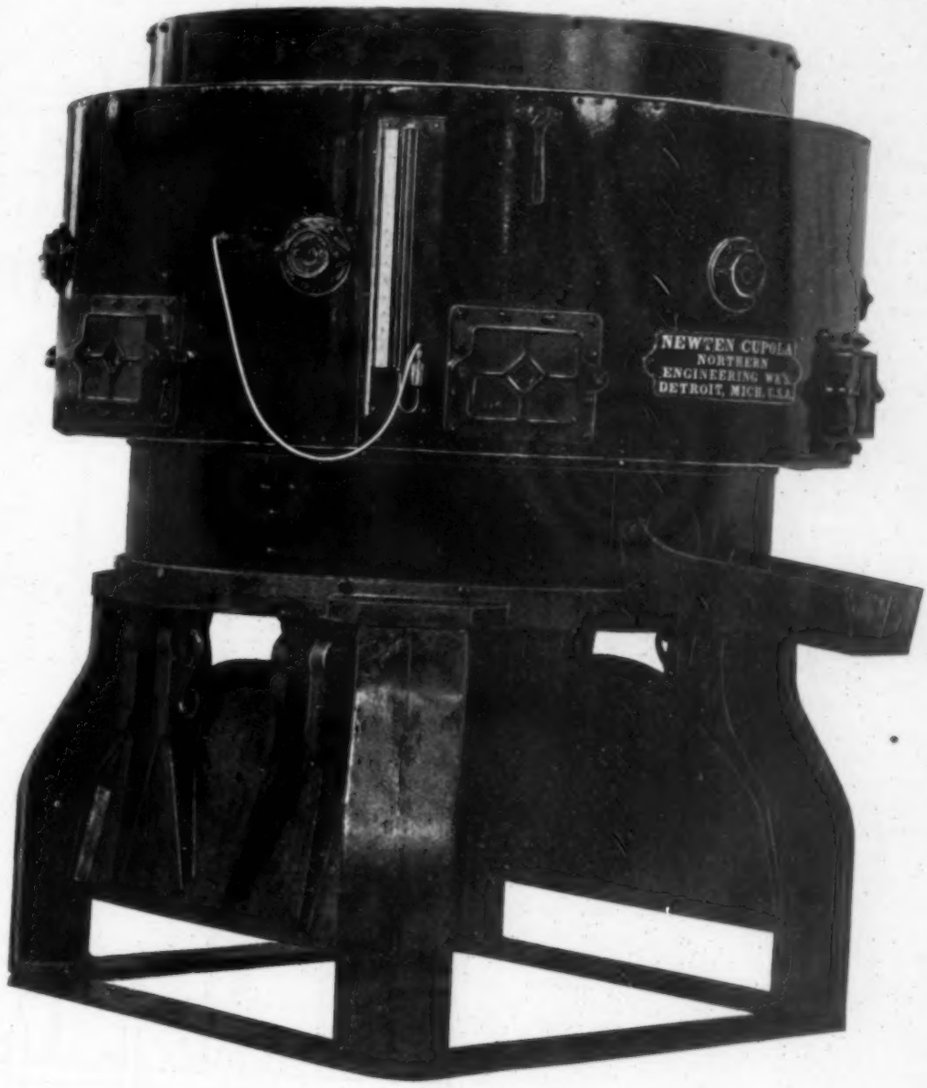
THE NEWTEN CUPOLA.

What the designers have named the Newten cupola is being placed on the market by the Northern Engineering Works of Detroit, Mich. In designing this cupola consideration has been given to the importance of proper tuyere area together with the most desirable tuyere shape. The object has been to secure as far as possible a distribution of blast over the entire area of the furnace. The tuyeres are adjustable. A safety tuyere is provided with soft metal trap.

The steel air chamber is of the belted type made entirely of steel, caulked top and bottom, and will keep tight under severe expansion and contraction. Peep holes are provided in the air chamber, all tightly fitted, and there are cleaning doors convenient to each tuyere.

The stack is of extra heavy steel, machine riveted in sections, with "down-opening" joints and with angle shelves for supporting the brick lining. The charging door is extra large, with a specially designed frame. The door is of either the wire screen or the plate type. Bottom doors are of the drop type, strongly ribbed, and having four hinge ribs on each door. Angle shelves, blast meter, improved tap and slag spouts, extra heavy bottom plate and foundation plates are all in accordance with the best modern practice.

This cupola is made in ten sizes, from 36 inches to 108 inches in diameter of shell, and is supplied either without stack as shown in cut, or with a stack of any desired height, to suit conditions. The usual extra attachments consisting of spark arresters, roof hoods, and operators' platforms are furnished on special orders.



NEWTEN CUPOLA.

FOUNDRY EQUIPMENT AND MANAGEMENT.*

BY EDWIN B. GILMOUR, MILWAUKEE, WIS.

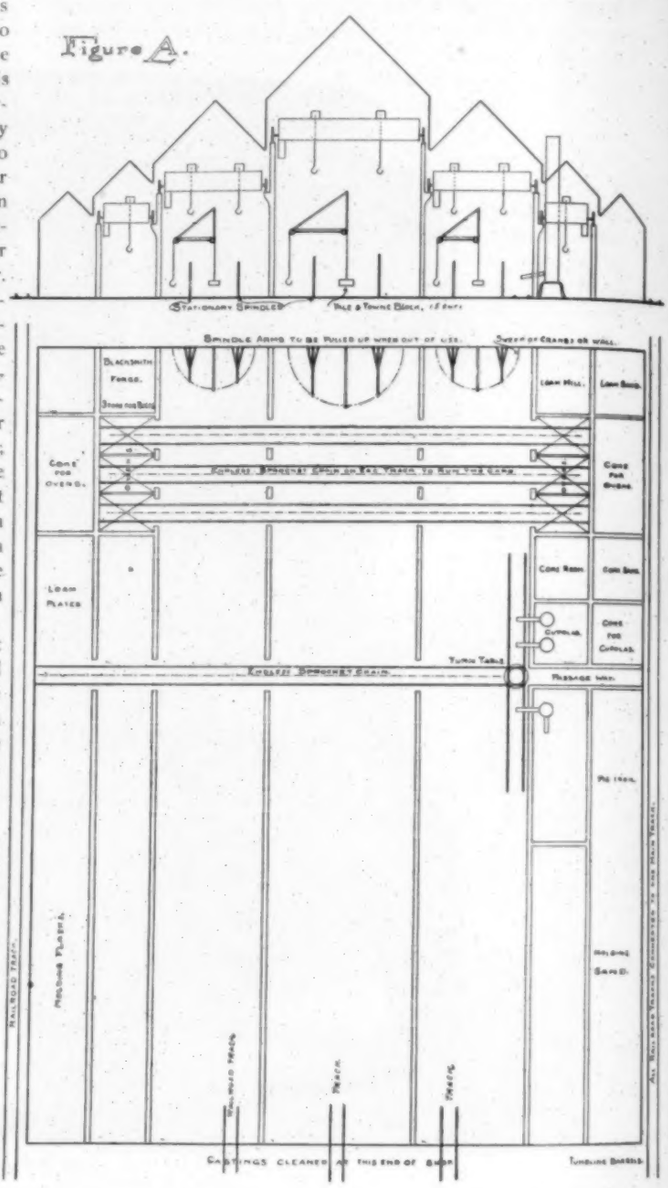
In the present age of progress, with the concentration of work and the reduction of prices to the minimum in all kinds of industries, and where the law of the "survival of the fittest" seems to assert itself, the idea has become prevalent among business men that it is not the largest percentage of profits that gives the greatest dividends, but that it is the largest output. In order that the foundry may keep pace with the other industries, it behooves foundrymen to adapt themselves to their surroundings and advance with the times in supplying the demand as it comes forth. This can only be done in building and equipping foundries on the most modern principles and getting rid of the idea that all that is essential is simply to have a crane, cupola and a drying oven, because to the unpractical mind this is about all that can be seen. These appliances are certainly the most important that are there, as is evidenced when visitors enter the foundry, the foreman showing with pride how fleetly his crane can run and how many movements can be made with it at one time; he will also revert to the cupola and expatiate upon its merits as a melter in quantity and quality. After a very careful consideration of this subject, and a large and varied experience in the foundry business in general, I deemed it advisable to submit for your consideration my ideas upon the title of this brief paper.

In the first place we will consider what a modern and up-to-date foundry should be when quantity and quick deliveries together are of greatest importance. The foundry should be built so as to have easy access to all other departments, especially the pattern shop and machine shop; it should be in a position to receive the greatest amount of light and air in order to dispell all of the obnoxious gases generated while casting; there should also be the greatst amount of comfort possible for the men employed therein, because in winter time, when it is excessively cold, you cannot get full value from the men when they do not feel comfortable, and in summer time, when it is extremely hot, if your place is not well ventilated, the men will very often walk home after the company has been at the expense to get up steam to run the plant.

The accompanying sketch, Fig. A, will give an idea of what I have designed and submit for your discussion. You will observe that I have adopted a system of building which may be called the "bay" system. A building of this description can only be used to advantage in a very large plant, or where a plant is put up with the expectation of enlarging from time to time. The main feature of this plan is to concentrate important operations as near to the center as possible, as a very long, narrow foundry may be a source of trouble by causing many delays, because one crane cannot pass on account of another being in use at some inconvenient place. It is desirable to have a crane equipped with double trolleys, the reason being obvious, for when there is a very heavy piece to make it is not practicable to put all the metal into one ladle, as this might be too heavy a load for one point on the crane; whereas if the crane has double trolleys a ladle can be suspended on each hook, which will amount to having two cranes. I have often seen three cranes used to pour a large piece, four ladles being used, one of the cranes taking two ladles (when one was emptied it had to be dropped down and another which was in readiness picked up). If the cranes had double trolleys they would have only used two cranes and done the work more expeditiously, thereby leaving the third crane free to take the iron away from the cupola and cause no inconvenience. In taking out heavy castings both hooks can be attached to a piece exactly as if two cranes had been employed. In the case of large molds, where two cranes are required (such as very large fly wheel molds), they can be lifted in the same manner. If at any time one of the motors should burn out you can hoist the block right up and run it out of the way, and use the other trolley until there is time to have repairs made, thereby avoiding the loss of time by having men waiting until the crane is in readiness again. In many cases where two cranes are used to roll over heavy molds one crane with two trolleys will serve the purpose just as well and save the inconvenience of keeping one crane waiting for the other.

At the end of the shop there should be placed stationary spindles for loam work, a wall crane is provided between every two spindles in order to lift them as well as other light plates out and in, as desired, so that there will be no waiting for the large crane. These wall cranes can be rigged with a chain and Yale and Towne block of 1,500 lbs. capacity, and can be operated by hand or electric power. When the spindles are out of use they can be suspended to a short chain attached to the pillars, and the arms can be pulled up against the wall, well out of the way. The drying ovens are placed in the side wings, three at each side (or as many as may be desired), the tracks are run clear across the shop, so that a mold can be put under any of the cranes, so that all three of them can be used

Figure A.



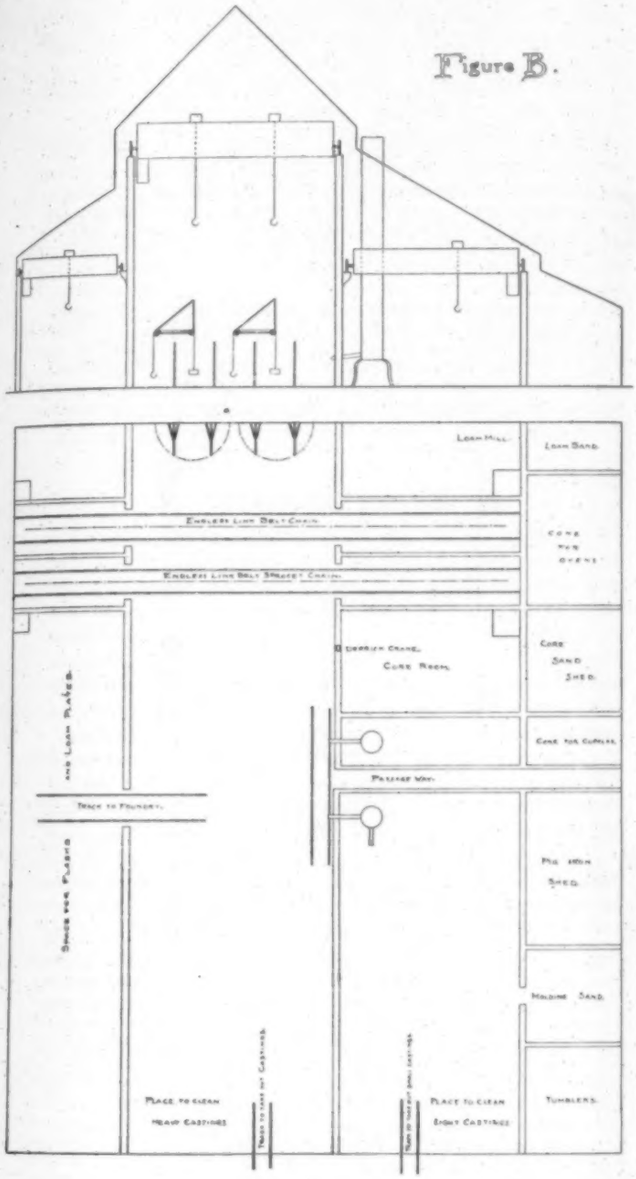
in connection with the same oven track at the same time if required. The cars are run out in the ovens with an endless link belt chain, a loose chain being hitched to the car with an "S" hook which can be attached to any link of the chain. Near the center of the shop are the cupolas, which are set up pretty high in order that an eight or nine ton ladle can be placed upon a truck and run underneath the spout. When filled it may be transferred under any of the cranes, or it can be side-tracked and another ladle set under. The end of the shop is reserved for the cleaning of all castings, and a railroad spur put in far enough to load and unload trucks with each crane. The tumbling barrels are placed in line with the sand sheds, so that the noise and dust may be kept outside of the foundry. Double emery wheels are placed in the side wing, and benches

*Read at the Buffalo meeting (June 4-6) of the American Foundrymen's Association.

provided with vises are installed in order to chip the small castings. On one of the tracks there can be placed a track scale large enough to weigh a regular flat car. All castings should be marked with the weight and date of making, and a record kept which can be referred to at any time in order to know the exact mixture of the metal used in them.

Attached to the foundry there should be a chemical laboratory, also equipped with a complete set of testing machines, in order to make all the required mechanical and chemical tests. I am of opinion that both are essential in all well regulated

Figure B.



foundries. I also believe that it is necessary for a foreman in the foundry to be possessed of some chemical knowledge on the mixture of metals and other materials used in the foundry. This knowledge can be easily acquired by any one who is desirous to receive the information, and I predict that in the future it will become one of the indispensable qualifications of any one who wishes to become a foundry foreman.

Along each side of the foundry is a railroad siding intended to distribute the coke to the ovens and cupolas. The sand and other material required in the foundry is placed in sheds built against the foundry wall, which serves to keep out the frost in winter time.

The cupolas should be provided with a regular system of trolley tracks and suspended trucks running from the pig iron sheds direct to the elevator, and from the elevator to the charging door of the cupola; each truck should hold a complete charge for the cupola. There should be a liberal supply of trolley trucks in order to save handling the iron too often. When these trucks are emptied they can be returned by the return truck to be refilled. A scale can be arranged in connection with the trolleys to weigh the charges. The trucks can be raised and lowered upon the scale by means of a long lever suspended from the trolley. In close proximity to the scale there should be a blackboard with each day's heat properly recorded, having columns itemizing the mixtures of each charge, and these charges should go in their regular order so as to prevent confusion. The order of the charges should be made out by the foreman each day and correct entry recorded in a book provided for the purpose. With reference to the cupola there are so many designs in the market that show special advantages, and there have been so many able articles written upon the subject, that it would be out of place for me, at this time, to revert to this subject in particular. In the August, 1900, issue of the *Foundry* I published an article upon the cupola, which was specially reviewed for the members of this association by our secretary. In connection with the cupola there should be installed a device which costs practically nothing to operate—the magnetic separator. A device of this kind is essential in a well equipped foundry where economy is studied, and I prefer the "Dings" separator which is made in Milwaukee for my own work.

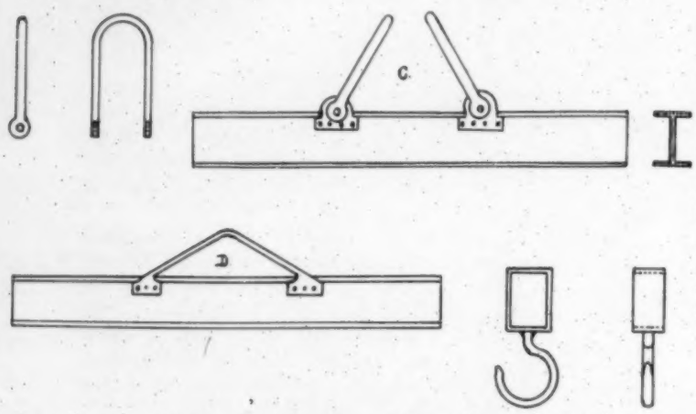
Fig. B. is the plan of a foundry of smaller dimensions and more suited to fill the requirements of the average foundry at the present time. The main feature of this building is the presence of only two bays, one large and one small one, so that all of the small work is kept together, the benefits of which will be readily seen by the interested observer. The description already given of the large plant will suffice for the smaller one, as they are built practically upon the same lines.

Of the numerous subjects brought under discussion among foundrymen there are none more important than equipment and management. There are so closely allied that the success or failure of a foundry is determined by a proper understanding of them. There are no subjects which have been more discussed; yet withal the information is as much needed to-day as ever. In reviewing the history of the iron foundry there has not been so fruitful a change as one might have expected. The foundry has not made the great advances that science and the arts have made; indeed, I consider that among the various appliances of mechanics the founder has the greatest need of incessant study. In every country and every locality that the foundryman has entered he is confronted continuously with new difficulties. In some sections of this country he has material which is suited in every respect to his requirements, consequently he has unbounded success in his work, while in other localities he is obliged to use materials which are unsuited to his business requirements; he has, therefore, to mix his materials in order to get the desired results. In general engineering there are certain rules to go by, which are the same the world over; the same applies to the draughtsman, the patternmaker, the blacksmith and all other mechanical lines. The workmen can also see the progress of their labors, whereas the molder is never sure of his work even after an engine built with it is working, because the castings may have some very severe contraction strains in them which are unknown until one of them unexpectedly gives way and surprises everyone.

The foundry business requires incessant study, as I have said, but it very rarely receives it, for when a bright boy comes into the foundry he very soon becomes dissatisfied on account of the nature of the work, it being hard and dirty, as everything in the foundry has to be produced by manual labor. Whenever the boy discovers any improved method of producing a piece, it is simply adopted as a matter of course in the shop in general, and he receives no credit for his study. Now, in the machine shop, if any one designs a machine to produce better and cheaper work, he may have his machine patented, and thereby be compensated, if not in money, at least in credit.

In equipping a foundry the manager should always be open to conviction and get the best tools which may be procured for the purpose at the lowest possible cost. In some large foundries it is customary to use a cross to lift heavy molds. Attached to this toolare heavy slings, which are made in many different styles. Some are simply huge links, and when these are used it is necessary to have a large assortment in order to

suit the various requirements. Again, some foundries have slings made in a most ingenious manner, and which can be extended to any length, and serve the purpose admirably. The most improved method of lifting heavy molds, however, is with a steel beam, best made of an I section and suspended at the center. A double shackle or clevice, with a loose hook at each end, which slips out and in on the beam to suit the requirements, will be seen in Fig. C. The reason for using double shackles is that with an uneven load the beam is suspended directly with each half, independent upon the hook of the crane, whereas if you only use the single bar as in Fig. D, at the least swing of the crane the load will roll in the hook and you run the risk of upsetting the mold which may be suspended. Chains of ample strength are suspended from these



hooks, which are lengthened at will to suit the requirements by using the design as shown in cut E. This is by far the most expeditious method of lifting heavy molds. The chains are more flexible and are light to handle, and the device takes up very little room when not in use. A good rule to go by in making these chain hooks is to double the size of the chain; thus for ¾ chain use inch and a half square iron bent over the diagonal section.

For the purpose of curbing, some founders use sheet iron plates about 72 inches by 30 inches, with a row of holes at each end in order to bolt them together. This is a very crude and slow method. Other founders use a cast plate made with lugs on the ends, so as to allow a pin to join the plates together.

FIG E.

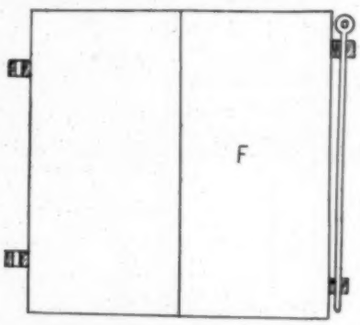
This plate, I believe, has been patented, and is made in various sizes to suit requirements. Being of cast iron, they are very heavy to handle, but are very good. In my opinion the best and most practical plate for curbing purposes is simply to take a steel plate three-sixteenths of an inch thick, as is represented in Fig. F. These plates are made 27 inches high and of various widths, to suit the circumstances, such as 36 inches, 24 inches, 18 inches, and 6 inches. For making runners it is advisable to have them 14 by 14 inches. These plates are very light, are easily transported from place to place and take up very little room in stacking up out of the way.

For binding or fixing molds together, bolts are the best. They can be made in various lengths, also lengthened to suit the requirements by using reverse hooks linked in a triangle or sling, which is put over the lower handles. The hooks should be made 6 inches, 12 inches, 24 inches, 36 inches, and so on, in any length as desired, and should be made of no less size of iron than 1¼ inches.

In the green sand shop there should be a plentiful supply of gages and an abundance of clamps and a place to put them. For all standard patterns there should be flasks for the purpose, with follow boards. All flasks which are too heavy for hand lifting can have trunnions bolted on the sides, so that they can be rolled over without lowering down: unless when too large, as they are then apt to spring a little. I have rolled very heavy flasks with trunnions, however.

When you enter a foundry at any time, the first thing which impresses itself upon your notice is the nature of the management, this being shown up by the general appearance of things. You will very often see in the loam shop portable spindles laying about in all directions, and being used for crow-bars and various other purposes. The same applies to all other tools. In the green sand shop you will find flasks piled up in all directions, molders will be seen hunting all over the yard looking for flasks, and when they find one that will suit it is carried into the flask shop to have it refitted for the pattern.

In this age of economy it is not practical to have molders do work which can easily be done by the helper. All flasks should be fitted to the pattern before being brought to the molder, all facing sands should be mixed and sifted by a power sieve and brought to the molder. The iron for casting should be carried by large ladles or conveyors, so as to be handled



quickly and cheaply. The castings should be taken off the floor at night, and the sand watered and cut up ready for use when the molder comes to work in the morning. The same rule applies to the loam shop, as molders are better satisfied to do only molding work. It is a good practice to have two men follow the crane and lift all work under the guidance of the molder making the piece. These two men will endeavor to locate all work in such a way that it will be for the general good. The manager should have complete control of his men. He should not become too familiar, as familiarity breeds contempt. He ought to be a good mechanic and competent to give advice whenever it is required, and not afraid to assume responsibility. Whenever orders are given they should be definite and decisive, because when orders come from one in command which are not decisive the men who receive them become careless and pay little attention. To a man possessing the requisite qualifications to become a competent manager a liberal salary should be given, because the success or failure of the company is determined by a proper knowledge of the business being entrusted to him, even if the company has unlimited capital.

In the management of the foundry there is nothing of more importance than to have a correct accounting of all that transpires. This can only be accomplished by a regular system of bookkeeping, so that the foundryman can intelligently estimate on whatever contracts may be upon the market. There should be a storeroom for the foundry, and all materials should be checked by the storekeeper, who should also be supplied with a regular set of books for recording everything. There should be a proper place for everything, so that he can hand out the goods as quickly as possible, and not have men lounging around the window. Whenever supplies are given out, he must record them against the job and the individual, and when the person knows that everything is recorded against him he will be very careful not to be wasteful. The storekeeper can also check up all castings which are delivered to the different departments, and in return take a material slip properly signed by the party receiving such castings. At the end of each month these books are balanced, and the cost per pound of every casting noted. An average cost of all castings should also be made, so that the foreman can instantly know how the foundry is doing, and if there should be any discrepancy he will know just where to locate the trouble.

American Foundrymen's Association at Buffalo.

BUFFALO, N. Y., June 4.—The sixth and what promises to be the most successful convention of the American Foundrymen's Association, opened here this morning in the hall of the 74th Regiment, N. G. N. Y. armory. Nearly 200 members were in attendance, more than 100 having arrived on Monday at the Niagara Hotel, the headquarters of the convention.

The Buffalo foundrymen who have the convention in charge are putting forth their best efforts for the entertainment and comfort of the visitors, and in addition to the general convention program there are elaborate social features.

The convention was called to order by President W. A. Jones, who introduced O. P. Letchworth of the Pratt & Letchworth Co. of this city. Mr. Letchworth welcomed the convention in the absence of Mayor Conrad Diehl. Speaking on behalf of the Buffalo Merchants' Exchange of which he is president, and the Buffalo Board of Trade, he extended to those present the cordiality of the city. In the course of his remarks the speaker touched upon the strained relations between capital and labor, in all sections of the country at the present time, and he deplored the stand taken by the labor leaders which he predicted, if persisted in, will result in the strangulation and destruction of the country's greatest interests. Mr. C. S. Bell responded appropriately to the remarks of Mr. Letchworth, thanking him on behalf of the association.

PRESIDENT'S ADDRESS.

President Jones followed with the annual address. He said that the association year has been a fairly prosperous one throughout the country, and one which until the past few weeks has not been marked with the upheaval of labor troubles which seem so difficult to avert during periods of prosperity. The association, he said, is no longer an experiment, but an educational institution whose influence is felt not only in this country but abroad as well. Referring to the *Journal* of the association he stated that it is just what the busy foundryman has wanted for years, but he was sorry to say it did not meet with the hearty support to which it is entitled. Continuing Mr. Jones said that he wanted to call the attention of the members to the great good accomplished by the sister organizations of the American Foundrymen's Association—the National Founders' Association and the National Metal Trades Association. He predicted that all who are conducting a manufacturing business will learn in the near future that they cannot well get along without them and the influence they exert. "These organizations are not aggressive, but progressive," he said. "They are the great medium by which we are brought in direct touch with the better element of organized labor. Labor organizations can only be successfully dealt with by the organized interest of the employer, and the two organizations referred to are recognized as an avenue to the amicable settlement of the difficulties that may arise, and that, too, without the introduction of those relics of barbarism, the strike and the lockout." As an evidence of this he cited the experience of the Stove Founders' Defense Association which has not had a single strike for ten years.

The president closed his address by paying a glowing tribute to the manner in which the secretary, Dr. R. G. Moldenke, had handled the duties of the office, by giving not hours nor days, but weeks of his valuable time, toward accomplishing the excellent results attained, and only too well known to every member of the association.

REPORT OE THE SECRETARY.

The secretary, Dr. Richard Moldenke, presented his report as follows:

In making this first report to our association your secretary desires first to review briefly those internal matters which so vitally affect our organic life. Established five years ago on the general belief that it would be a good thing for foundrymen to get together, the Association came to life in a period when methods began to change partly through the exigencies of the hardest times this country has ever passed through, and then again by reason of rapid developments to be credited to our investigators. The result was a plenty of foundry practice to be discussed by those who were anxious to keep in the front rank as producers, and conventions, the main features of which were drifting to the incidental entertainment. Gradually, however, matters of daily practice were fairly well discussed, and the achievements of the "industrial engineer" in lines other than ours beginning to be felt most uncomfortably by those of us who supply the enormous tonnage he consumes, attention was perforce turned to the subject of rapid production of castings at selling prices far below anything we had ever known. From then on the questions of standardization so ably foreseen and provided for in our constitution were taken up and thus a purpose given our deliberations which promised to be of most far reaching consequence. Our members will no longer scan the programs so much for the charming courtesies of our generous hosts, but will look for the sober business which may mean so much in their future commercial relations.

As a remarkable corroboration of these statements it may be added that correspondence with practically all writers on foundry topics has developed the fact that our most practical foundry managers are studying foundry science deeply and make daily application of it in their own works. Throughout the year it has been the aim of your secretary to obtain papers relating to points of practice in the foundry, but the results show that either the subject is already too well threshed out, or that the newer foundry methods are monopolizing almost everybody's attention. In any case our members were not the losers, and the range of foundry thought was pretty evenly covered, as may be seen in our publications.

At the close of the last fiscal year it was recognized that radical measures were necessary to prevent the anticipation of collections in carrying out the work of this Association in the future. First, the members in arrears several years were communicated with, as well as those who had never even paid any dues at all. Where repeated letters would not bring a response the *Journal* was first stopped, and the member finally dropped. This very necessary action meant the removal of 26 names from the list. Quite a number of resignations must also be chronicled, the reasons given varying from none to the plea that the funds were needed for other associations. Then again consolidations of foundries have left their effect. The total loss in membership amounted to 59. We can, however, chronicle the addition of 41 new names, some of which came to us through the generous action of the Pittsburg Foundrymen's Association in amending their constitution so as to include a membership in our association in the annual dues. The full effect of this change will be felt during the coming fiscal year. The present total membership is 297. Attempts were also made to induce the other local foundrymen's associations to follow the example of the Pittsburg Association, but resulted in failure. We have furthermore to thank the Pittsburg Foundrymen's Association for their generous appropriation of nearly $80 to pay for the printing and distribution of some 3,000 pamphlet parts of our *Journal* to 1,000 foundrymen of this country in order to bring our work before them. This was supplemented later on by the distribution of a further nearly equal amount of literature, together with 1,000 invitations to our convention. Thus the American Foundrymen's Association has been well put before the public, and judging from the number of inquiries and letters of acknowledgment received, much good should result therefrom.

At the time of the last financial report there was a balance of $233.24 in the treasury, with $562.14 owing for printing and postage, and $750 due the association from its members. Of this $320 could not be collected, so that the real balance would have been $101.10, with collections averaging six months in advance. The accounts at the beginning of this coming fiscal year are as follows:

Disbursements for "Journal" (Of which $458.95 is chargeable to old accounts paid off, and $81.73 for the coming year.)	$1,224 86
Postage. (Of which $3.18 is for old account.)	194 19
Printing	135 25
Sundry expenses	68 03
Traveling expenses—None charged.	
Salaries (With $600.00 still owing.)	587 66

There are no other bills outstanding. The income was as follows:

Balance in treasury	$ 34 48
Dues collected during year	1,854 00
From standardizing bureau	376 30
Other income from sales, etc.	13 52
Total	$2,278 30

To this is to be added the uncollected dues for June and the outstanding dues for the year, a safe estimate of which is $780. The cash balance in the treasury is $68.31.

The condition of our finances is therefore not alarming, but is not sound, as the income is represented by collections averaging six months ahead, and the disbursements are on account of requisitions which have been filed. What is required is a regulation of the dues so that they may be collected at one or two times during the year at most. In this way the expenses can be made commensurate with the income and a better apportionment for the various accounts agreed upon. Only when the funds for the disbursement of the year are available near its beginning will the association be safe financially. A sudden cessation of business would otherwise find members with dues advanced and no return therefor in sight. As it will not be policy to raise the dues of this association, only an increased membership will bring about the desired end.

The form of the *Journal* was changed radically at the beginning of the fiscal year just completed, and the pamphlet form, which has been found so satisfactory by our great technical bodies, adopted. Our funds being limited, the idea of furnishing an annual volume in which papers, discussions, etc., could be nicely arranged and indexed, could naturally not be entertained. However, by sub-dividing into parts, paging each part continuously, an arrangement was brought about which permitted an easy method of indexing and will, it is hoped, form a substantial volume of foundry progress for the past year. The subscription list of the *Journal* has been increased, and many extra copies were called for by our members and friends.

Your secretary has found the criticism and suggestions of many of our members very valuable, and begs for further expressions touching upon the publication of our journal which, as you know, is intended to be a compendium of contemporary foundry literature, much upon the plan of the Journal of the Iron and Steel Institute of Great Britain. Especial care was taken to get the papers read throughout the year in the hands of our members at least as soon as they could be published by the technical press, which by the way, was well cared for and valued by our association. The proceedings of the local associations were taken from the journals which were represented at the meetings, the secretaries not furnishing us with copies of the minutes in question. Proper credit was always given therefor.

Your secretary must further express his sincere pleasure at the reception accorded his reviews of foundry articles appearing in the technical press of the world. These entailed an immense amount of labor, and embraced many subjects heretofore untouched, but nevertheless of interest to our foundrymen. The best evidence of their value seemed to be in the constant receipt of requests for reviews of specified articles, which the respective writers desired others to get the benefit of also. If the funds of our association would only allow it these reviews would be extended considerably, with the consequent enhancement of the journal to our members.

In connection with the *Journal* question it may interest our members to know something of the amount of work entailed by the rather vigorous presentation of our interests before the industrial world. Early in the year it became necessary to retain a post office box to accommodate the many exchanges and letters which arrived daily. Your secretary wrote 1,799 letters, dispatched 3,714 circulars and 8,241 pamphets, or in all, 13,754 pieces of mail, and in this feels quite certain that there are not many members of the iron industry of the world who are not aware of the aims and objects of this association, inasmuch as the correspondence extended to England, Germany, France, Italy, Finland and New South Wales. It rests with us now to build upon this and develop a financial strength which will still further increase the usefulness of our association to the trade at large.

In accordance with the resolution concerning the better training of our future foundry managers, passed at the last convention, your secretary begs to report that this matter was taken up by correspondence with practically all our institutions of learning which devoted some attention to technical education. With only one exception replies were received, and these indicated the serious thought given to the problem. Indeed the establishment of a department for foundry theory and practice has been strongly recommended in the case of the Cernegie Technical School. A very extended series of letters was the result, for many of our universities wished to know in what way they could aid our industry. The consensus of opinion seems to be that pending special equipment for the purpose instruction should be given in foundry practice by lecture and regular visits to the more advanced foundries of the respective districts. Summer classes should be formed for the students who wished to make this their life work, or they should become volunteers in order to learn what they can of the practical operations of foundry procedure. Once the foundry becomes the desirable field for technical students it should, and the institutions for learning are enabled to add foundry apparatus to their equipment, plenty of use will be found for it, not only for teaching the various branches of the industry, but for advanced investigation, and consequent benefit to the students as well as ourselves. We sincerely hope this agitation in teaching circles may go on, and feel that as our requirements become better known thereby the solutions will suggest themselves in the natural course of events.

The relation of our association with the local bodies of foundrymen has been most pleasant. Papers have been furnished to the Pittsburg, Philadelphia, New England, Milwaukee and St. Paul and Minneapolis Foundrymen's associations regularly, and it is to be hoped that our association may eventually reap some benefit by way of increased membership therefrom, in return for the effort and expense entailed in the collection and distribution of nine papers in editions of 250 copies each, in addition to the regular work of the association throughout the year.

In obedience to a request for information relative to the melting loss in the cupola process, your secretary distributed suitable blank sheets of inquiry and is still receiving returns. The amount of interest created is most gratifying, replies having come even from Europe, and those of our foundrymen who may still wish to help obtain this information of such importance to the trade are requested to communicate with the secretary. It is hoped that a synopsis and study of these memoranda can be presented early in the fall.

From the numerous requests for specifications for gray iron castings received during the year, from the operating departments of great industrial corporations, the action which will be taken on the report of our committee on standardizing the testing of cast iron will be observed with much interest. Indeed, the magnitude of our industry is such that the wish has been repeatedly expressed that our association should take up this question seriously with the International Association for Testing Materials at the coming convention in Buda-Pesth, acting through the American Section, of which we are members.

It is with deep regret that your secretary must chronicle the death of two of our members during the past year. Mr. W. H. Carpenter of Providence, R. I., and Mr. Sylvester N. Leary of Brooklyn, N. Y., both gentlemen being prominent in their respective communities. Our sympathy goes out to their bereaved families in fullest measure and we pray the Almighty to heal the wounds in His good time. Further, a few weeks ago, your secretary received one of his letters to our friend, Capt. Henning of Berlin, returned unopened with the notice "deceased" written upon it. The foundry trade of Germany loses its most ardent advocate of progress, and many of our American foundrymen a very warm friend.

There is little more to be said. On reflecting upon the events of the past year one is forcibly brought face to face with the fact that an association of men having heavy interests in

a given line of production to maintain against the keenest of competition in the world's markets, should find itself in position to be of the greatest possible benefit to its members and the trade at large. The sum and substance of this is really to furnish information which will cheapen the production of castings by the method of making them. The work done by our individual experiments should be carried out under the auspices of this association. Reports should be made from time to time on the actual condition and the workings of improvements which are of general interest. To do this properly requires a staff so organized that the value of the work done is commensurate with the expense entailed. This in turn is based upon a large membership and financial support which would enable good men to devote their entire time to the respective work they may be selected for. Even now we are in receipt of a courteous invitation to place some of our advanced studies more especially on the electrical properties of gray iron and steel castings in the care of Pardue University, which is doing such splendid work for the railroad, electric light, and telephone interests. It is to be hoped that our association may soon be able to avail itself of this opportunity.

The association may never arrive at the desired stage of development as outlined above, but the necessity for it in a growing industrial country is pointed out herewith, and the hope expressed that some measure at least may eventually be realized.

The treasurer's report was next called for, and Howard Evans, of the J. W. Paxson Co. of Philadelphia, who had been unable to attend the four previous conventions on account of ill-health, arose and explained that his report was contained in that submitted by the secretary. As soon as Mr. Evans' presence became generally known he was escorted to a seat on the rostrum and was given a hearty round of applause.

The report of the committee on constitution was laid on the table until Wednesday evening. The report of the committee on the Standardizing Bureau was read by Thomas D. West and adopted and the president was authorized to appoint a committee of three to investigate uniform methods of making chemical analyses of pig and cast iron. The committee of five that drew up this report was continued.

REPORT ON STANDARDS FOR TESTING CAST IRON.

The report of the Committee on Standardizing the Testing of Cast Iron was presented by the chairman, Thomas D. West, whose associates on the committee are James S. Stirling, J. S. Seaman, Jos. S. McDonald and Dr. Moldenke. The report is as follows:

Your committee desires to state that during the past year sufficient work has been done to warrant a final report based upon the results obtained, and the conclusions derived therefrom. The magnitude of the operations was fully realized at the inception of the plan, but it was held that the necessities of our industry on the one side, and the constantly growing demands from buyers on the other, fully warranted every effort of time and trouble given to this important subject so vital to our existence. All of the members of your committee are active foundrymen heavily burdened with responsibilities which leave little leisure for the more interesting pursuits of industrial science, yet as little time as possible was lost and only those investigations postponed which were not actually required for the purposes of this report.

We must therefore beg that our report be received and our committee on standardizing the testing of cast iron be discharged; and we beg further that permission be granted to the individual members of our committee to utilize the mass of material collected, for further investigations of interest to the foundry trade and the publication of such results as part of the proceedings of this Association.

Since our last convention there have been made 555 tests, many of which were kindly performed by Mr. H. E. Diller, of Pittsburg, Pa., making the sum total for the complete work 1,601 tests made on 1,229 test bars, not counting the chill pieces and fluidity strips, the whole material handled weighing, roughly, 15 tons. To those of our friends who have helped us so generously we extend our hearty thanks and take exceptional pleasure in stating that beyond publishing our results in the *Journal* this Association has not been asked to make any disbursements for the prosecution of our investigations, your committee having arranged this question in its personal capacity, deeming the outlays but a small return for the honor conferred by you.

There is considerable detail still remaining in the way of tabulations and critical studies of our series of tests made in all the distinctive classes of cast iron. These matters will be attended to and published from time to time in the *Journal*. The results we have obtained have been thoroughly discussed by us and are summarized in the following:

There are two methods of judging the physical quality of castings. First, in the abstract, judging the quality of the iron entering into them; this leaves out the elements of uncertainty introduced by the things which happen after pouring. Second, in particular, the quality of the casting for the purpose intended. This can only be ascertained by testing the casting itself, or at least the representatives of a given lot. This

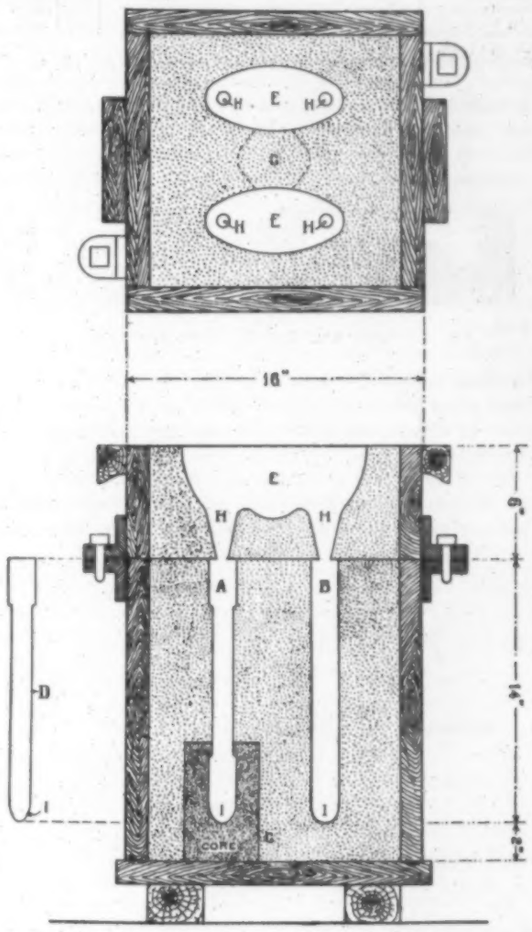


FIG 1.—METHOD OF CASTING TEST BARS

latter method, of greatest importance to the buying element, will likely always be studied and specified by them, and cannot therefore be well taken up by our foundrymen on the initiative. Nevertheless when such questions arise we should be found well equipped to offer suggestions as to the value of proposed tests, in the light of our knowledge of the physical properties or iron going into castings. Car wheels, car couplers, boiler castings, pipe, etc., are among the numerous things now brought regularly under specifications which insure good results, the tests being made on the castings themselves. As these particular instances, however, will always remain the great minority of the foundry product, the method of testing which will most concern us is that which judges the iron entering into the molds.

Cast iron, so far as its availability for various classes of castings is concerned, depends upon a given chemical composition and a physical constitution dependent also upon the nature of the mixing and the heat treatment. That is, once the chemical composition best suited for the work is de-

termined upon, there still come in the effects of the kind of the pig iron used, the proportion of pig iron to remelted material, the steel and other additions, the melting process used, and the kind of molds poured into.

If you will look over the records of tests published by this committee you will see that we have differentiated the various classes of iron into all pig, and pig and scrap mixtures. Then again into cupola and furnace irons, warm and cold blast charcoal, coke, and mixed charges. Finally in an arrangement which divides the classes by their chemical constituents. Table 1 shows this more clearly:

Series.	Class of Iron.	Melted in	Pig Iron Used	Size of Heat.	Si.	P.	S.
A*	Ingot Mold.	Cupola.	Coke.	60 tons.	1.67	.095	.032
B	Dynamo Frame.	Cupola.	Coke & Charcoal	60 "	1.95	.405	.642
C	Light Machinery.	Cupola.	Coke & Charcoal	40 "	2.04	.578	.944
D	Chilled Roll.	Air Furnace.	Cold Blast Char.	30 "	0.85	.482	.07
E	Sand Roll.	Air Furnace.	Warm BlastChar	30 "	0.72	.454	.07
F**	Sash Weight	Cupola.	Coke & Charcoal	15 "	0.91	.441	.218
G	Car Wheel.	Cupola.	Charcoal & Coke	10 "	0.97	.301	.06
H	Stove Plate.	Cupola.	Coke.	20 "	3.19	1.160	.084
I	Heavy Machinery	Cupola	Coke.	30 "	1.96	.522	.061
J	Cylinder.	Cupola.	Coke.	10 "	2.49	.839	.084
K	Novelty.	Cupola.	Coke.	5 "	4.19	1.236	.080
L	Gun Metal.	O.H.Furnace	Coke & Charcoal	10 "	2.32	.676	.044

*All pig iron.
**Nearly all burnt scrap originally from charcoal and coke irons.

Throughout the whole line of operations only regularly constituted mixtures were used, the balance of the heats from which these test bars were cast going directly into commercial castings of the classes designated. The results are there-

FIG 2.—CORE BOX, TENSILE TEST PATTERN.

fore entirely comparable with daily practice, and are not exceptional cases prepared specially for a good showing. For purposes of comparison green sand and dry sand bars were made side by side even though the iron in practice goes into only one of these classes of molds. It was felt that comparison records were wanted just as much as specifications for the separate lines of product. For this reason also we recommend one standard size of test bar for comparative purposes only, each class of iron being given its special treatment for the information wanted in daily practice, in addition.

Our studies on the shape of the test bar have resulted in the selection of the round form of cross section, and this mainly on the score of greatest uniformity in physical structure, the corners of the square bar introducing elements which become troublesome, especially in irons with a lower range of silicon contents. It is fully realized that the work of testing bars, especially transversely, is made more difficult by the adoption of the round bar, but after all this should only mean the taking of proper precautions in measuring the actual net deflection, that is, deducting the upper and lower indentations in the bar by the knife edges, as ascertained by micrometer measurement, from the deflection record.

Now a word as to tests in general. Probably only the larger foundries will be in position to have a complete testing laboratory in connection with the chemical equipment, and these are urged to make their testing records part of their sales departments. There is nothing so potent in preventing burdensome and illiberal specifications on the part of buyers as the ready access to records which clearly show the daily run of work. Not only will customers be encouraged to rely on the ability of the founder to turn out uniformly good work, but the founder himself will be in position to keep up his product to his own desired standard of excellence or look for the reason why if this is not accomplished. The foundries that do not feel justified in equipping themselves even with the good and cheap outfits for transverse tests will eventually have to run the risk of rejections for cause, as they will not know from day to day how their product is turning out in quality so far as the iron itself is concerned. A determined effort is being made by the progressive portion of the foundry trade to retrieve some of the lost ground by improving the quality of the iron entering into castings. In no way can this process be watched better than by applying a standard and comparative system of testing the results.

There is still a further point in the preparation of test bars of interest, and that is the making of coupons from which the quality of the casting to which they are attached is to be judged. This method is used extensively in government work and in the making of cylinder castings. The idea of obtaining material from the same pour in the same mold as part of the casting itself is good enough in theory. Unfortunately, however, this direct connection introduces elements of segregation and temperature changes in the cast iron which make this test less valuable than is generally supposed. At best the iron which has passed through the different parts of a mold before entering the space for the coupon will not be representative of the whole body, but rather one portion of it only. We therefore recommend the method shown later on in Fig. 1. The metal can be poured from crane or hand ladle clean and speedy and possesses the temperature of the average iron in the casting more nearly than the coupon method now practiced.

Your committee, while giving specifications for the tensile test of cast iron, is of the opinion that the transverse test is the more desirable and certainly within reach of even the smallest foundry. We further would suggest to the mechanical engineers of this country the desirability of standardizing the speed at which the various tests should be performed, and also the urgent necessity of studying the impact test in its various phases. We deem these questions outside of the province of this association, our work being the selection of methods for getting at the true value of the material we sell without prejudice or favor.

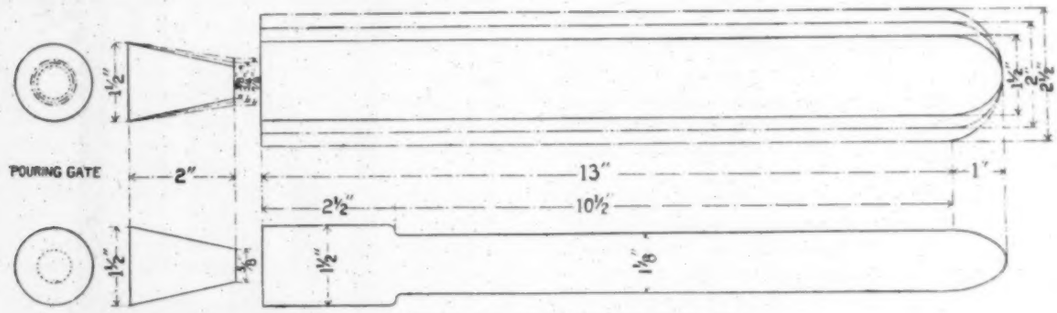


FIG 3.—PATTERNS FOR TEST BARS FOR CAST IRON.

Sizes of Test Bars.

In selecting the test bars for the purpose of specification we have followed the cardinal principle of selecting the largest cross section for the iron consistent with a sound physical structure and within the range and structural limits of an ordinary testing machine. The following are the sizes of bars selected for tests as a result of our investigations:

For all tensile tests a bar turned to .8 in. in diameter, corresponding to a cross section of ½ sq. in. Results, therefore, multiplied by two, give the tensile strength per square inch.

For transverse test of all classes of iron for general comparison, a bar of 1½ in. diameter on supports 12 in. apart, pressure applied in the middle and deflection noted. Similarly for ingot mold, light machinery, stove plate and novelty iron a 1½ in. diameter bar; that is to say, for irons running from

2 per cent in silicon upward or from 1.75 per cent silicon upward where but little scrap is in the mixture.

For dynamo frame, sash weight, cylinder, heavy machinery, and gun metal irons, similarly a 2 in. diameter bar is recommended; that is, for irons running from 1.50 to 2 per cent in silicon, or where the silicon is lower and the proportion of scrap is rather large.

For roll irons, whether chilled or sand, and car wheel metals, a 2½ in. diameter bar is recommended; that is, for all irons below 1 per cent silicon, and which may therefore be classed as the chilling irons.

The method of molding the test bars we would recommend is given herewith:

It will be readily understood by every practical foundryman. Both tensile and transverse bars are shown in the same flask. The elevation shows the tensile bar at A and the transverse one at B. The core C is used with the tensile bar in order to ram it on end. A hole in the floor will save an extra parting if desired. In starting to mold up the bars the dried core is set on the bottom board, and then the pattern as seen at D placed into the hole in the top of the core and let rest on its bottom. Now ram up the bar with green sand in the usual manner. The plan shows four bars. This can be modified as desired. If no tensile bars are wanted, the core is avoided altogether. Two bars may be poured at a time, or four, or more, by simply connecting the pouring basin E E as shown by the dotted line G G, in which case, however, the basin E E should be made much smaller. At least three bars of a kind should be made for a given test. The accompanying sketches give all the necessary dimensions. It will

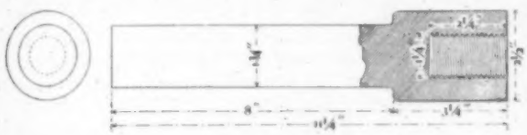


FIG. 4.—STEEL SOCKET FOR TENSILE TEST OF CAST IRON. TWO REQUIRED.

FIG 5 — STANDARD TENSILE TEST BAR FOR CAST IRON.

be noted that the bottom of the mold is conical as seen at I. This is to present a sloping surface to the dropping iron and avoids cutting.

These bars could be molded flat and poured on their end by arranging the flask in such a manner that pouring gates and basins can be provided on top. The extra labor to carry out this method would in a measure counterbalance the making of the core C. The only advantage of molding flat lies in the greater certainty of bars free from swells when made by inexperienced molders.

The sand should not be any damper than to mold well and stand the wash of the iron without cutting, blowing or scabbing. It should be rammed evenly to avoid swells, and poured by dropping the metal from the top through gates or from the ladle direct into the open mold. If the sand will not stand pouring from the top, then pour from the bottom by means of whirl gates. If there are more than four bars to be poured from the same ladle of iron, where it would take more than two minutes' time in pouring, they should be gated so that the one pouring basin can fill all the gates at about the same time, thus insuring all bars in a set having the same temperature of pouring. After the bars are cast they should remain in their molds undisturbed until cool.

Proposed Standard Specifications for Gray Iron Castings.

1. Unless furnace iron, dry sand or loam molding, or subsequent annealing is specified, all gray iron castings are understood to be of cupola metal; mixtures, molds and methods of preparation to be fixed by the founder to secure the results by purchaser.

2. All castings shall be clean, free from flaws, cracks, and excessive shrinkage. They shall conform in other respects to whatever points may be specially agreed upon.

3. When the castings themselves are to be tested to destruction, the number selected from a given lot and the tests they shall be subjected to are made a matter of special agreement between founder and purchaser.

4. Castings shall be under these specifications, the iron in which is to be tested for its quality, shall be represented by at least three test bars cast from the same heat.

5. These test bars shall be subjected to a transverse breaking test, the load applied at the middle with supports 12 inches apart. The breaking load and deflection shall be agreed upon specially on placing the contract, and two of these bars shall meet the requirements.*

6. A tensile strength test may be added, in which case at least three bars for this purpose shall be cast with the others in the same molds respectively. The ultimate strength shall also be agreed upon specially before placing the contract, and two of the bars shall meet the requirements.

7. The dimensions of the test bars shall be as given herewith. There is only one size for the tensile bar and three for the transverse. For the light and medium weight castings the 1½ inch D bar is to be used, heavy castings the 2 inch D, and chilling irons the 2½ inch D test bar.

8. Where the chemical composition of the castings is a matter of specification in addition to the physical tests, borings shall be taken from all the test bars made, well mixed, and any required determination, combined carbon and graphite alone excepted, made therefrom.**

9. Reasonable facilities shall be given the inspectors to satisfy themselves that castings are being made in accordance with specifications, and, if possible, tests shall be made at the place of production, prior to shipments.

These somewhat general specifications are doubtless capable of being modified, but are presented by us to this association for discussion and possible approval in lieu of anything better now in existence. The specifications should certainly be fair to consumer and founder, and, as experience teaches us better, can be suitably modified from time to time.

From the first outline of our plan of casting test bars, now known so generally, to the final completion of this report we have endeavored to obtain information valuable to our industry, and sincerely hope that much good may result from this, we think, impartial series of conclusions.

The report was adopted and the committee was discharged. A vote of thanks was tendered the committee with especial mention for Dr. Moldenke. Thereupon the session was adjourned.

TUESDAY AFTERNOON.

The afternoon session opened with an address by Senator H. M. Ramp of Missouri on "Benefits of the American Foundrymen's Association" as viewed by an outsider. He paid a high tribute to the work done by the American Foundrymen's Association and said that since its organization both the founder and molder have been the gainers.

A. G. Rossi of New York then followed with a lengthy discussion of his paper on "Influence of Titanium on Cast Iron." Further remarks on this subject were made by Alfred Ladd Colby, metallurgical engineer, of the Bethlehem Steel Co. of South Bethlehem, Pa.

J. G. Sadlier read a paper on "The Problem of the Molder," which was discussed at some length.

Mr. Thomas D. West discussed his paper on "The Influence of Manganese on Cast Iron," and his remarks were fully concurred in by Mr. Colby, who said that the Bethlehem Steel Co. has used high manganese iron with the greatest success.

Edward B. Gilmour of Milwaukee, Wis., read a paper on "The Foundry and Its Equipment," which will be found on another page. After the reading of a paper on "The Control

---

*NOTE. The remarkably wide range of values for the ultimate strength and modules of rupture which are really good for the various classes of iron, precludes the giving of definite upper limits in the specifications. It will therefore remain a matter of mutual agreement in each case, the requirements of service and price per pound paid regulating the mixtures which can be used.

**NOTE. There should really be no necessity for this test, for the requirements of the physical tests presuppose a given chemical composition. It may, however, sometimes be expedient to know the total carbon, silicon, sulphur, manganese and phosphorus of a casting to insure good service conditions.

of the Foundry," by Percy Longmuir of Sheffield, Eng., adjournment was taken.

During the afternoon the ladies were given a carriage ride through the city, guests of the wives of the Buffalo members.

In the evening the visitors were the guests of the Buffalo foundrymen at the Pan-American Exposition. The program for Wednesday provides for a visit to Niagara Falls with a session in the evening.

Willis Brown of Erie, Pa., and Thomas D. West of Sharpsville, Pa., are spoken of in connection with the presidency for the ensuing year.

THE ROLL OF ATTENDANTS.

The enrollment of members and guests is as follows:

W. A. Jones, W. A. Jones Foundry & Machine Co., Chicago.
J. S. Seaman, Seaman-Sleeth Co., Pittsburg, Pa.
R. Moldenke, Sec'y A. F. A., New York.
C. S. Bell, C. S. Bell Co., Hillsboro, O.
Howard Evans, Treas. American Foundrymen's Association, Philadelphia.
J. Frank Dye, Newport Sand Bank Co., Newport, Ky.
O. T. Stanial, Illinois Malleable Iron Co., Chicago.
F. W. Schultz, *Iron Age*, New York.
John Kane, Belmont, N. Y.
E. S. Morrison, DuBois, Pa.
H. Nauert, Ridgway, Pa.
A. L. Colby, Bethlehem Steel Co., So. Bethlehem, Pa.
H. G. Byram, Byram Foundry Co., Indianapolis, Ind.
F. C. Schwoerer, Indianapolis Foundry Co., Indianapolis, Ind.
J. D. Robeson, American Glutrose Co., Camden, N. J.
J. J. Bever, Otis Steel Co., Ltd., Cleveland.
J. P. Winlock, Barbour-Stockwell Co., Cambridge, Mass.
A. W. Link, Erie Foundry Co., Erie, Pa.
A. Carpenter, A. Carpenter & Sons Foundry Co., Providence, R. I.
David Reid, Saco & Pettee Machine Shops, Biddeford, Me.
W. G. Rothwell, General Electric Co., Schenectady, N. Y.
D. F. Eagan, H. E. Pridmore M. M. Co., Chicago.
J. D. Smith, J. D. S. Foundry Supply Co., Cleveland.
M. F. Gallagher, New York Air Brake Co., Watertown, N. Y.
F. S. Cadwell, Hill & Griffith Co., Cincinnati.
A. W. Bair, C. M. & St. Paul R. R., Milwaukee, Wis.
Stanley G. Flagg, Stanley G. Flagg & Co., Philadelphia, Pa.
H. Hansen, *The Foundry*, Cleveland.
C. B. Reed, Parlin & Orendorff Co., Canton, Ill.
E. B. Gilmour, E. P. Allis Co., Milwaukee.
D. Fraser, Chain Belt Co., Milwaukee.
R. S. McPherran, E. P. Allis Co., Milwaukee.
W. A. Draves, Northwest Malleable Iron Co., Milwaukee.
W. B. Hosford and H. L. Bell, Dodge Mfg. Co., Mishawaka, Ind.
G. H. Lincoln, Geo. H. Lincoln Co., Boston.
R. Blyth, Walker & Pratt Mfg. Co., Watertown, Mass.
F. H. Holt, Watt Mine Car Co., Barnesville, O.
J. A. Lanigan, Lawrence, Mass.
Wilhelm Lanigan, Lawrence, Mass.
F. S. Phelps, H. E. Pridmore, Chicago.
S. D. Tompkins, Smooth-On Mfg. Co., Jersey City
J. Magee, Magee Furnace Co., Boston.
I. W. Winchester, Magee Furnace Co., Boston.
Chas. N. Choate, Bridgeport Deox. B. & M. Co., Bridgeport, Conn.
B. M. Shaw, Walker & Pratt Mfg. Co., Boston.
Wm. Hanson, Pennsylvania Iron Works, Philadelphia.
J. C. Ford, Frankfort, Mich.
B. F. Bacon, Pickands, Brown & Co., Chicago.
J. F. Mills, Abendroth Bros., Port Chester, N. Y.
J. F. Mills, Jr., Abendroth Bros., Port Chester, N. Y.
Willis Brown, Walker Foundry Co., Erie, Pa.
Thos. D. West, T. D. West Foundry Co., Sharpsville, Pa.
T. J. Best, Warden King & Son, Montreal, P. Q.
H. McPhee, Bridgeport, Conn.
W. J. Shennan, Bethlehem Steel Co., Bethlehem, Pa.
C. L. Prince, General Electric Co., Schenectady, N. Y.
W. H. Knowles, Ottawa, Ill.
J. A. Walker, Dixon Crucible Co., Jersey City.
H. J. Rober and H. Lamp, Bettendorf Metal Wheel Co., Springfield, O.
D. Gallagher, Hecla Graphite Co., Easton, Pa.
R. M. Barnett, Brass Founders Supply Co., Newark, N. J.
Geo. B. Buckingham and H. P. Buckingham, Arcade Malleable Iron Co., Worcester, Mass.
J. J. Burgen, Lane Mfg. Co., Montpelier, Vt.
W. S. Pattin, Pattin Bros. Co., Marietta, O.
D. P. Pattin, Pattin Bros. Co., Marietta, O.
J. G. Sadlier, Springfield Foundry Co., Springfield, O.
A. I. Findley, *Iron Trade Review*, Cleveland.
E. S. Gaylord, J. D. Smith Foundry Supply Co., Cleveland.
Wm. Yagle, Wm. Yagle & Co., Pittsburg.
Robt. A. Walker, *Iron Age*, Pittsburg.
J. A. Meighan, Dawson Bros. & Meighan, Pittsburg.
J. A. Logan, Jones & Laughlins, Pittsburg.
D. J. Thomas, Sterritt & Thomas Foundry Co., Pittsburg.
S. D. Sleeth, Westinghouse Air Brake Co., Pittsburg.
F. H. Zimmers, Union Foundry & Machine Co., Pittsburg.
J. S. McCormick and T. E. Malone, J. S. McCormick Co., Pittsburg.
J. McLaren, Phillips & McLaren, Pittsburg.
S. Groves, Westinghouse Machine Co., Pittsburg.
E. B. Price, Wheeler Foundry Co., Worcester, Mass.
E. J. Lyon, Brown & Sharpe Mfg. Co., Providence, R. I.
Theo. H. Colvin, Colvin Foundry Co., Providence, R. I.
A. W. Walker, Walker & Pratt Mfg. Co., Boston.
H. E. Asbury, Enterprise Mfg. Co., Philadelphia.
J. Ormrod, Donaldson Iron Co., Emaus, Pa.
W. M. Fitzpatrick, S. Obermayer Co., Cincinnati.
W. F. Prince, H. R. Worthington, Elizabeth, N. J.
P. R. Ramp, C., B. & Q. Foundry, Aurora, Ill.
E. J. Sherwin, Cuyahoga Falls, O.
W. N. Gartside, Diamond Clamp & Flask Co., Richmond, Ind.
W. E. Warner, E. C. Stearns & Co., Syracuse, N. Y.
J. S. Kingsland, Buffalo Foundry Supply Co., Buffalo.
H. L. Schwarzenberg, Cleveland.
John Hill, Hill & Griffith Co., Cincinnati.
A. O. Backert, *Iron Trade Review*, Pittsburg.
J. W. Busch, Pratt & Cady Co., Hartford, Conn.
I. R. Baer, Anniston, Ala.
W. H. Coffin, T. P. Kelly & Co., New York.
E. A. Pridmore, H. E. Pridmore, Chicago.
Geo. G. Hood, Roberts Machine Co., Collegeville, Pa.
S. T. Johnston, S. Obermayer Co., Chicago.
C. D. Koch, Wm. Sellers & Co., Philadelphia.
W. W. Sly, Cleveland.
T. H. Morcom, Colorado Iron Works, Denver.
C. H. Lewis, Cherry Valley Iron Co., Pittsburg.
E. P. Osgood, Osgood & Witherly, Boston.
J. W. Conway, Hartford Foundry Co., Hartford, Conn.
L. S. Brown, Springfield Facing Co., Springfield, Mass.
W. C. Free, Rockford, Ill.
D. S. Drysdale, Illinois Sewing Machine Co., Rockford, Ill.
Chris. J. Wolf, L. Wolf Mfg. Co., Chicago.
E. W. Smith, Crane Co., Chicago.
W. Nygren, Frances & Nygren, Chicago.
R. J. Cleveland, Cleveland & Barr, Chicago.
C. H. Green, C. H. Green & Co., Syracuse, N. Y.
E. H. Mumford, Tabor Mfg. Co., Philadelphia.
T. B. Ward, Manning, Maxwell & Moore, Cleveland.
J. A. Kittiesen, Moline Scale Co., Moline, Ill.
T. E. Malone, J. S. McCormick Co., Pittsburg.
W. B. Cleveland, Cleveland & Barr, Chicago.
C. J. Wiltshire, Gates Iron Works, Chicago.
A. M. Thompson, Link Belt Machinery Co, Chicago.
A. K. Beckwith, Beckwith Estate, Dowegiac, Mich.
H. M. Ramp, Crescent Iron Works, Springfield, Mo.
Geo. Wiard, Wiard Plow Co., Batavia, N. Y.
E. J. Lambert, Syracuse Chilled Plow Co., Syracuse, N. Y.
Phil. C. Smith, Ingersoll-Sergeant Drill Co., Easton, Pa.
W. D. Trabue, Phillips & Buttorff Mfg. Co., Nashville, Tenn.
Auguste J. Rossi, New York.
J. G. Armstrong, Struthers & Wells Co., Warren, Pa.
H. Cordingly, Queen City Foundry Co., Denver, Col.
J. J. Lawlor, Brooklyn, N. Y.
F. E. Lonas, Maywood Foundry & Machine Co., Chicago.
W. S. Morehouse, Rumsey & Co., Ltd., Seneca Falls, N. Y.
R. F. Mickle, Philadelphia Pneumatic Tool Co., Philadelphia.
Sumner E. Brown, Springfield Facing Co., Springfield, Mass.
C. L. Tittle, Blairsville, Pa.
Simon Kemp, Catasaque, Pa.
A. F. Koons, Webster, Camp & Lane, Akron, O.
C. M. Helme, Hall & Sons, Buffalo.
S. W. Spear, East Buffalo Iron Works, Buffalo.
Robert C. Hickok, H. G. Trout & Co., Buffalo.
A. E. Doak, Whitehead Bros. Co., Buffalo.
H. S. Madden, Howard Iron Works, Buffalo.
Albert Hoppin, Edw. P. Allis Co., Buffalo.
Chas. G. Shepard, Buffalo.
O. P. Letchworth, Pratt & Letchworth Co., Buffalo.
Henry W. Wendt, Buffalo Forge Co., Buffalo.
P. M. Ginther, J. Ginther's Sons, Buffalo.
E. C. Neal, Weed & Co., Buffalo.
E. J. McCartney, Beals & Co., Buffalo.
Pemberton Smith, New York Car Wheel Works, Buffalo.
F. C. Mosedale, M. A. Hanna & Co., Buffalo.
E. G. Felthousen, Acme Steel & Malleable Iron Works, Buffalo.
E. P. Mooney, Ingersoll-Sergeant Drill Co., Cleveland.
L. A. Denton, Buffalo.
J. J. Lawlor, Lawlor Iron Works, Buffalo.
H. A. Boyd, Whiting Foundry Equipment Co., Buffalo.
E. C. Lufkin, Snow Steam Pump Works, Buffalo.
C. W. Jones, Rosedale Foundry Co., Allegheny, Pa.
E. R. Burroughs, Herendeen Mfg. Co., Geneva, N. Y.
J. J. Lawlor, Lawlor Iron Works, Buffalo.
S. F. McRoberts, *American Manufacturer*, Pittsburg.
F. Carrick, Globe Iron Foundry Co., Erie, Pa.

M. T. Hand, Philadelphia Pneumatic Tool Co., Philadelphia.
Wm. H. Steinkamp, Abendroth & Root Mfg. Co., New York.
Robert B. Thomson, Buffalo Forge Co., Buffalo.
O. R. Roenius, Grand Rapids, Wis.
H. J. Scott, Struthers-Wells Co., Warren, Pa.
S. H. Baird, S. H. Baird & Co., Buffalo.
C. G. Robinson, Peru Steel Castings Co., Peru, Ind.
James F. Beckett, Walter F. Wood Mowing Machine Co., Hoosick Falls, N. Y.
Henry E. Pridmore, Chicago.
B. F. Chambers, E. P. Allis Co., Buffalo.
F. H. Chamberlin, J. D. Smith Foundry Supply Co., Cleveland.
H. F. Frohman, S. Obermayer Co., Cincinnati.
D. C. Warren, *The Foundry*, and *The Iron Trade Review*, New York.
James Gorman, Lawrence, Mass.

SCALE DECISIONS OF THE MILWAUKEE CONVENTION.

(Special Telegram.)

MILWAUKEE, WIS., June 5.—After a great deal of discussion, the Amalgamated Association convention has adopted practically the same sheet mill scale as now in force, for presentation to the manufacturers, the contention for a unionizing of all the sheet mills being considered a sufficient point to gain. President Shaffer's work in favor of adopting a non-interruptive feature has injured his strength, and some one else may possibly be elected to succeed him. The next convention will probably be held in Wheeling or Columbus.

James H. Nutt, secretary of the labor bureau of the Republic Iron & Steel Co. and American Steel Hoop Co., wired President Shaffer that he would be in Milwaukee Thursday with conferees to have a preliminary conference with the wage committee on the iron scale. However, he reached this city yesterday, and his earlier coming is presumably to use his influence with delegates in favor of the non-interruptive clause. It is believed this clause will finally be given to a conference committee with wide discretionary powers and with the arbitration clause omitted.

The tin plate scale was adopted with few changes. Instead of fixing arbitrary advances over tin plate prices for sheets rolled in tin mill the workmen will insist on full differential between tin plate and sheet wages being paid, and any large sheets not tinned in the works are to be considered sheets and not tin plate. The sheet scale as finally adopted has been changed giving the shearman one seventh of the price of rolling instead of one eighth. This does not affect the tin scale.

The puddling scale is based on $5 on a 1-cent card, but as finally arranged it is said to provide for no advance on less than 1.4c for bar iron. The progression is as follows: 1.4c, $5.25; 1.5c, $5.50; 1.6c, $5.75; 1.7c, $6; 1.8c, $6.12½; 1.9c, $6.25; 2 cents, $6.37½.

New Ownership of Pennsylvania Steel Co.

Drexel & Co. of Philadelphia made the following announcement on Monday: "The stock of the Pennsylvania Steel Co., both preferred and common, in the hands of Drexel & Co. for the underwriting syndicate, has been sold to investors. The control of the company has not passed to the United Steel Corporation, but has not been bought with any view of antagonizing its interests. The new owners will operate in harmony with the general interests of the steel trade." The stock referred to is that issued by the reorganized Pennsylvania Steel Co., operating under the New Jersey charter granted April 29 last, and authorizing $25,000,000 of common stock and a like amount of 7 per cent non-cumulative preferred. Out of the $16,500,000 common and $10,750,000 stock actually issued, Drexel & Co. held $10,000,000 preferred and $9,000,000 common.

There have been conflicting statements concerning the new ownership, but it is now authoritatively announced that John Lowber Welsh is the purchaser. It has been stated, though not officially, that he represents John W. Gates and associates. Drexel & Co. are reported to control the Cambria Steel Co. and it is said have made a proposition to the Bethlehem Steel Co., looking to consolidation.

The Cleveland-Cliffs Iron Co. is preparing for the erection at Marquette, Mich., of the charcoal blast furnace which it has contemplated for some time. The site is in North Marquette. F. C. Roberts & Co. of Philadelphia are the designers of the furnace. Work will begin very shortly.

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

(Continued from page 18.)

Applied Science, Cleveland; "Pulley Press Valve," by F. H. Stillman, the Watson-Stillman Co., Brooklyn, N. Y.; "Determination of Fly-Wheels to Keep the Angular Variation of an Engine Within a Fixed Limit," by J. I. Astrom, Nordberg Mfg. Co., Milwaukee, Wis., and "A Special Form of Boring and Facing Machine," by W. S. Russell, Russell Wheel & Foundry Co., Detroit, Mich.

The discussion of Mr. Alstrom's paper was very lengthy, and brought out some very interesting experiences of the various members. Mr. William L. Abbott, of the Chicago Edison Co., Chicago, said that about three years ago, he was called upon to make calculation of a determination for variation in angular velocity of an engine during stroke for the purpose of determining what the area would be in connecting two triple expansion 500-horsepower engines, driving direct connected alternators which were to be run parallel. He said he looked about for some literature on the subject, but failing to find anything evolved a method of determining this which he had since applied to a 3,500-horsepower compound Allis engine, which is now being built. This he explained by the use of diagrams.

The discussion was participated in by Prof. Chamberlain, of Chicago; Mr. Abbott, C. O. Kerr, D. C. Jackson, H. G. Reist and Albert K. Mansfield.

FRIDAY EVENING.

At the closing session, the following papers were read: "Efficiency Tests of 125 h. p. Gas Engine," by C. H. Robertson, Purdue University, Lafayette, Ind.; "A Method of Preparing and Baling Cotton in Round Bales," by J. R. Fordyce, Little Rock Gin & Machinery Co., Little Rock, Ark.; "Protecting Ferric Structures," by M. P. Wood, and "An Improved Type of Ingot-Heating Furnace," by F. H. Daniels.

In the discussion on the last named paper, President Wellman called attention to the fact that one of these furnaces was in operation in Worcester, Mass., where it is giving very satisfactory service. Mr. Wellman said: "This is almost the first effort to build and run a furnace where the ingots are to be kept in their vertical position during the time of heating. It may not be known to all members, but it is a fact that almost all of the heating of small billets from 2-inch to 4-inch sections in the United States is now done in continuous furnaces. This is very satisfactory in many respects. One advantage is, that it is a cheaper furnace, and gets out a very much larger tonnage. But the principal advantage is, that it is more economical to operate than any other furnace. I think the average of fuel consumed in the continuous heating furnace is not more than one-half the quantity that is consumed in the regenerative furnaces that have been built. For rail steel, a continuous furnace that heats an ingot vertically would be very desirable because it is very often the case that an ingot goes into the furnace while it is still liquid in the interior, and if that ingot is laid down on its side, the cavity due to the shrinkage of the steel in cooling may be in the middle of the ingot and may not appear until the rail has been rolled and placed in service, and that has been disastrous on more than one occasion. That is the reason why, in making rail steel, ingots are heated in vertical furnaces almost universally in what is called the soaking pit furnaces, but as far as the fuel is concerned the vertical soaking pit furnace is very economical."

The discussion then ended, and no more papers coming before the society, the meeting adjourned after a nominating committee was appointed and resolutions of thanks passed.

SUPERHEATED STEAM.

BY E. H. FOSTER, NEW YORK CITY.

This paper briefly considers the modern aspect of the practice of raising steam to a temperature considerably in excess of the saturation point, immediately after its generation in the boiler, without greatly increasing the pressure. The subject is not new, having as far back as 1850 attracted general atten-

tion among engineers and numerous tests showing remarkable gains by the use of superheated steam were made at that time. As in the case of many other mechanical improvements some apparently insurmountable impediment appeared to block the course of progress and the practice fell into disuse and was almost forgotten, to be again taken up at a later date when the conditions governing its use appear to be more favorable. Chief Engineer Isherwood in the first volume of researches conceded the great economy of superheated steam but considered its use undesirable on account partly of the weight and bulk of the requisite apparatus, but more especially the bad effects of superheated steam on the interior parts of the cylinder and the valves, due to the destruction of the lubricating oils before they have had a chance to do their work. In spite of this condemnation the saving in the coal pile was too great to be ignored and so much progress was made that in the second volume, only two years later, the same author devotes even more attention to the subject and arrives at quite different conclusions.

Mr. Isherwood states that an average gain of 33 per cent may be counted upon. He recommends the steam to be superheated not more than 135 degrees Fahr. and suggests 100 degrees as an average which it is safe to assume because of the inability of the oil to stand a higher temperature without destruction. The improvements made in the steam engine were of such a nature as apparently to diminish the importance of superheating. In reality the present day steam engine is much more suited to the use of superheated steam than formerly. We have now mineral oils which will stand high temperatures without disintegration; stuffing boxes packed with metallic packing; cylinders and steampipes covered with a much more efficient insulating material; wearing surfaces of cylinders and pistons machined to a nicety and the interior surfaces often highly polished; improved forms of balanced and steam-tight valves, and these seem to open a field for the superheater to an almost unlimited degree.

The methods of superheating resolve into a system of tubes or pipes through which the steam is passed after leaving the boiler on its way to the engine; these pipes being subjected to the hot furnace gases, either in connection with the steam boiler itself or in a separate setting having a fire of its own. Much rivalry exists between the use of cast iron and wrought iron tubes for superheaters. For general use the author leans towards the cast iron construction, believing that it possesses greater durability, and because of the greater mass of heated metal which serves to maintain the temperature of the steam at a much more even point and is not so much affected by the working of the fire. For example, when the fire door is open the blast of cold air taken in has a chilling effect on the superheater, and this is much more pronounced if the tubes are of light wrought iron construction than if they were of cast iron with a corresponding thickness. The same objections to cast iron in boilers cannot apply to superheaters. The presence of water in a boiler gives rise to unequal temperatures which produce severe internal strains in the metal, whereas a superheater contains no water, and the comparatively even temperature of the steam relieves the metal of all strains except those due to the bursting pressure.

Mr. Foster expresses the opinion that with the use of superheated steam some of the reasons for a multiplication of steam cylinders disappear; tests having shown a compound engine to give better results than a triple expansion under similar conditions of work. It may truthfully be claimed that the superheater utilizes the heating surface of the boiler more efficiently. In a well-proportioned plant where the waste gases are rejected at a low temperature, the net gain by superheating will obviously be less than in a plant where available heat is allowed to find its way to the chimney.

RULES FOR A DRAWING OFFICE.

BY A. W. ROBINSON, MONTREAL, CAN.

The author in 1894 presented a paper to the society on the "Relation of the Drawing Office to the Shop in Manufacturing," in which he gave a set of rules used in the drawing office under his charge. The present contribution is a concise revision of the preceding paper. Mr. Robinson recommends that the standard size be 23 inches by 36 inches, subdivided into half, quarter, and eighth sheets, with full size drawings for general views, and that shop details shall be shown on quarter and eighth sheets. Different kinds of work should not be shown on the same drawing. All shop drawings liable to repetition shall be traced and blue-printed; temporary details may be made on sketch sheets and press-copied. Every dimension necessary to execute the work is to be clearly stated and measurements to be given with reference to the point from which work is to be laid out, also with reference to center lines. All figured dimensions to be in plain round vertical figures, not less than ⅛-inch high, and formed by lines of uniform width; sufficiently heavy to print well. No diagonal-barred fractions allowed. All dimensions below two feet to be in inches. Center lines to be alternate dot and dash; dimension lines double dot and dash. Every drawing, whether whole or half-sheet, to have the title, date, scale, and number of the sheet stamped in lower right-hand corner; and the quarter and eighth sheets printed on top.

The name of the drawing, as given in the title, is invariably to have two divisions in one line separated by a hyphen. The first part to be the general name of the thing or machine; the second is to clearly designate the part or parts represented (or if a general view should so state). Drawings shall bear surname only of draftsman and examiner. Piping details to be in diagram form with standard symbols. All detail parts to be shown unassembled as far as possible.

Detail shop drawings should state: (a) The pattern number of every casting in larger figures than the dimensions; (b) The material, using symbols as follows:

C. I.—Cast Iron.
W. I.—Wrought Iron.
M. S.—Machinery Steel.
H. S.—Hammered Steel.
Bs.—Brass.
Bbt.—Babbitt.
Bz.—Bronze.
C. R. S.—Cold Rolled Steel.

For other materials write full name. Finished surfaces will be indicated by "f" written on the line or surface. In cases where finish might be assumed but is not required, follow the figures by "cast" if a casting, and "rough" if a forging. [Why not "nf."?]

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Mt. Union Silicon Brick Co. of Mt. Union, Huntington Cy., Pa., has been incorporated with a capital of $100,000. A plant is to be built at Mt. Union, where the company owns large deposits of gannister. The directors are Francis J. Torrance, W. H. Hill, Scott Dibert, John H. Waters and George W. Wagoner.

The American Belting Co. of Youngstown, O., has been incorporated with a capital of $50,000 to manufacture belting of all kinds. J. E. Davis, J. S. McClurg, J. F. Harrington, G. F. Arrel and J. E. McVey are the incorporators.

At a meeting of the stockholders of the Willoughby Dock Co. held at Youngstown, O., last week, directors were elected as follows: George Tod, E. L. Ford, John Stambaugh, J. G. Butler, Jr., H. H. Stambaugh and C. D. Hine. J. G. Butler, Jr., was elected president; E. L. Ford, vice-president; H. H. Stambaugh, secretary and treasurer.

Capitalists interested in the Kokomo Steel & Wire Co. of Kokomo, Ind., have been in Louisville, Ky., during the past week looking at sites for a proposed wire plant.

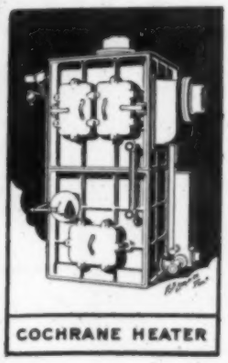
The Rossie Iron Co. of New York City has been incorporated with a capital of $25,000. Benjamin Nicoll, H. W. Goodrich and Joseph Wharton are the incorporators.

G. A. Crosby & Co., of Sarnia, Ont., has been incorporated with a capital of $600,000 to operate a foundry and machine shop. The directors are James L. Board, William S. Cumming, Charles R. Morrison and Thos. H. Cook.

The Reade Machinery Co. of Cleveland, O., has been granted a charter with a capital of $25,000.

The White Locomotive Works has been incorporated in New Jersey with a capital of $200,000. C. W. Morrison, R. L. Welterbeck and W. B. Seldur are the incorporators. The new company will manufacture locomotives.

The Wisconsin Graphite Co., Pittsburg, which has purchased the plant of the Portage County Graphite & Mineral



COCHRANE HEATER

Cochrane Feed-Water Heaters.

In many plants there are two waste products, through the use of which considerable economies can very often be effected. These are the heat in exhaust steam and the heat in the fuel gases.

Even if the conditions prevailing in the plant favor the use of an economizer, in almost every case it will be found of advantage to utilize exhaust steam for heating the water before it goes into the economizer, as these appliances are subject to expansion and contraction strains the same as boilers, if cold water is passed into them. They are also affected by scale formations and deposits pretty much the same as boilers, and they are more subject to corrosion through the action of the sulphur in the coal.

Besides, the **COCHRANE FEED-WATER HEATER AND PURIFIER** does some things that are not within the province of any other apparatus—it saves the condensed exhaust steam (which contains no scale-forming matter), it acts as a receptacle for all live steam drips coming through traps, and into it may also be brought the returns from heating or drying systems.

While economizers are of great advantage in many locations, they cannot do the work of or displace a **COCHRANE HEATER.**

HARRISON SAFETY BOILER WORKS,

Clearfield & 17th Sts., - - - - - - - - Philadelphia, Pa.

Paint Mfg. Co., at Stevens Point, Wis., is in the market for three pulverizers, for graphite and oxide, one rotary dryer, conveying machinery, one mixer, two paint mills and one ore crusher.

The Wisconsin Bridge & Iron Co., North Milwaukee, Wis., is reported to be in the market for a number of second-hand machine tools.

The National Rolling Mill Co., of Hartford City, Ind., which is building a mill for the manufacture of steel and iron bars, expects to be ready for business by July 1. The officers are: E. B. Mitchell, president; J. H. Jones, secretary and treasurer; S. N. Bradshaw, general manager; H. R. Philips, superintendent. The directors are the first three officers named, with H. B. Smith and J. R. Johnston.

New Construction—

The New Jersey Steel & Iron Co. of Trenton, N. J., one of the constituent companies of the American Bridge Co., will make extensive additions to its plant. A power house 52x122 feet is to be erected in addition to a boiler house, 50x53 feet, a bridge shop 60x128 feet and a forge shop 53x198 feet.

The Geneva Metal Wheel Co. of Geneva, O., is now operating a foundry, 50x103 feet in connection with its other business.

The Burde Valve Co. of Philadelphia will erect a machine shop at Coatesville, Pa.

The New Haven Steel Rolling Mill Co. of New Haven, Conn., will erect a new rolling mill building, 80x100 feet.

The Chicago, St. Paul, Minneapolis & Omaha Railway Co. will erect a machine shop at St. Paul, Minn.

Work has begun upon the erection of the plant of the Milwaukee Forge & Iron Co. at Milwaukee, Wis., and it is probable that the plant will commence operations in September. The shops will have a frontage on the Kinnickinnic river of 260 feet and will extend back to the Milwaukee railway tracks. The machine shop, 192 feet long and 60 feet wide, will front on the dock. The forge shop will be an immense structure, built around three sides of a quadrangle and enclosing the remainder of the plant. The main portion of this shop will be 232 feet long. The north wing will be 187 feet long while the south will be 183 feet long. The buildings will be 60 feet wide and 25 feet high. The gas producers will be located in a building adjoining the forge shop, which will be 127 feet long and 60 feet wide. All of the gas burned in the forges will be produced by eight gas producers. The Wisconsin Bridge Co. has been awarded the contract for the erection of a steel trolley truss 426 feet long and 26 feet high. There will be 13 forges and nine steam cranes. There will also be six heavy hammers and a 30-ton electric crane will be installed by Pawling & Harnischfeger of Milwaukee. The machine shop equipment will cost about $80,000. The cost of the plant complete will amount to nearly $400,000.

The Browning Mfg. Co. and the Kempsmith Tool Works have each purchased sites for manufacturing establishments at West Allis, near Milwaukee, Wis. The removal of the plants from Milwaukee will not occur for a year at least.

Plans for the new plant of the Buckeye Malleable Iron and Coupler Co. of Columbus, O., have been completed by the Wellman-Seaver Engineering Co. of Cleveland, O. The new plant will undoubtedly be the largest malleable iron plant in the country, even surpassing in output that of the Pennsylvania Malleable Iron Co. of McKees Rocks, Pa. It will have a daily capacity of 200 tons of castings and 1,200 couplers, and according to prepared specifications will not cost less than $500,000. The plant will be built on a site of 34 acres on South Parsons Ave., between the tracks of the Hocking Valley and Toledo & Ohio Central railroad. The plans provide for the construction of nine buildings, two of which will contain the malleable foundries and which are the largest of the group will be 750 feet long, 100 feet wide and 50 feet high. Five furnaces will furnish the metal for the foundries which will be equipped with all the latest labor saving devices. Two Corliss engines of 300-h. p. capacity each will furnish the power. The

The Robert Field Company,

20 Hayden Building, COLUMBUS, OHIO.

SELLING AGENTS FOR

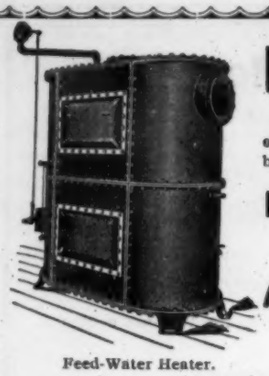
"SLOSS," "FLORENCE," "LADY ENSLEY" AND "SHEFFIELD" brands of Alabama Foundry and Forge Pig Iron.

"GLOBE" the best Jackson County Ohio Silvery Softener.

"Alexandria," "Preston" and "Bessemer" Connellsville Foundry Coke.

"CLIMAX" Kanawha Foundry Coke. Smithing Coal.

Western Office: ST. LOUIS, MO.



Feed-Water Heater.

FEED WATER HEATERS

Cut herewith illustrates Stilwell's latest design. Made entirely of cast Iron. Saves fuel and filters the feed water for steam boilers. Use only exhaust steam.

BOILER FEED PUMPS

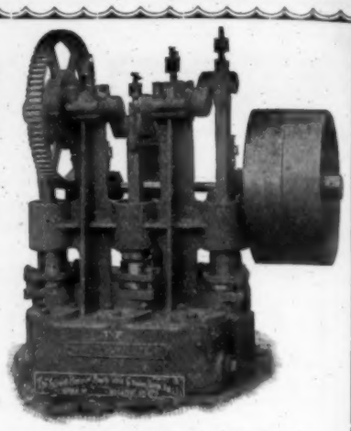
SINGLE, DUPLEX AND TRIPLEX.

AIR COMPRESSORS

JET-CONDENSERS-SURFACE

IF INTERESTED ADDRESS

The Stilwell-Bierce & Smith-Vaile Co., 327 Lehman Street, DAYTON, OHIO, U. S. A.



Triplex Boiler Feed Pump.

company will establish its own electric light plant which will not only furnish light for the entire plant but power for the operation of cranes, etc. Work on the buildings will be commenced shortly and the new plant will be ready for operation about Jan. 1.

The American Malleable Castings Co. is locating a plant at Chicago Highlands, near Barrington, Ill. The main building of the plant will be 541x110 feet, with an engine room 42x162 feet. The plant will be placed in operation in September.

The Pittsburg District.—

On June 24, application for a charter for the Pittsburg Steel Co. of Pittsburg, Pa., with a capital of $2,500,000 will be made. The prime mover in the organization of the new company is Wallace H. Rowe, who last week tendered his resignation as manager of the Pittsburg district of the American Steel & Wire Co., and sundry other companies, subsidiary to the American Steel & Wire Co. The business and plant of the Pittsburg Steel Hoop Co. at Monessen, Pa., will be taken over by the new company and additional works will be built. The company now owns a tract of 60 acres at Monessen which will permit the erection of an extensive plant. At the present time plans have not yet sufficiently matured for publication, but it has been learned that the company will erect a rod mill of large capacity, the contract for which has already been awarded to the Garrett-Cromwell Engineering Co. of Cleveland, O. A wire plant will also be installed and a large number of wire nail machines will consume the greater portion of the wire product. In addition to Wallace H. Rowe, the incorporators are: John and Edwin Bindley, of the Bindley Hardware Co., of Pittsburg; Emil Winter; W. C. Reitz, treasurer of the Pittsburg Steel Hoop Co., and Willis F. McCook.

The Colonial Steel Co. of Pittsburg was granted a charter this week with a capital of $1,000,0000. The new company will erect a large crucible steel plant at Colona, near Monaca, Pa., where a large tract of land has been secured. The incorporators of the company are James W. Brown, George A. Howe, both of Howe, Brown & Co., absorbed by the Crucible Steel Co. of America; T. H. Childs, C. M. Brown and Lewis H. Hayes.

A charter was granted this week to the Carnegie Tube Co. of Pittsburg, with a capital of $150,000. The new company will erect a tube mill at West Carnegie, Pa. The directors are R. M. Vincent, W. H. Skivington, H. E. Nichols, J. A. Scott, Bissell Everson, E. F. Grant and A. A. Hutchinson.

The Oil Well Supply Co. of Pittsburg will erect a large addition to its plant on Railroad St., near Twenty-second St., to cost about $75,000. The building will be of brick and steel construction, 264 feet long, and 106 feet wide and three stories high. The company will branch out more extensively in the manufacture of oil well drillers' tools.

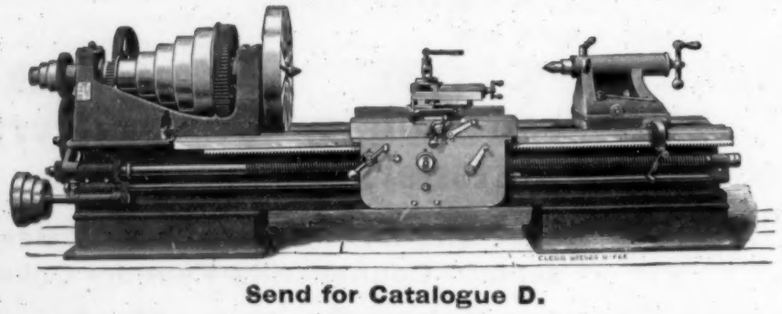
Fire in the engine room at the Edgar Thomson Steel Works of the Carnegie Steel Co. last week resulted in a loss amounting to several thousand dollars.

The American Steel & Wire Co. will in a few days commence the erection of a large cooper shop in connection with its plant at Rankin, Pa. The company's shop was destroyed by fire nearly a year ago, and the new shop will take the place of the temporary affair erected last summer.

A verdict of $40,000 for the plaintiff in the case of the Lake Superior Consolidated Iron Mines against the Salem Iron Co. was returned in the United States Circuit Court at Pittsburg last week. The suit was commenced to recover $48,048 from the defendant company for its refusal to accept a large order for ore on a contract between the parties. The defense was that the president of the Salem Iron Co. had acted for the defendants without authority from its company.

The Pressed Steel Car Co. has received an order from the Chesapeake & Ohio Railway Co. for 400 hopper coal cars and also an order from the Algoma Central Railway for 50 hopper

Schumacher & Boye, CINCINNATI, O.



Engine Lathes.

Send for Catalogue D.

MOUNT SAVAGE FIRE BRICK.

UNION MINING CO.

ESTABLISHED 1841.
CAPACITY,
60,000 PER DAY; 18,000,000 PER YEAR.
The First Manufactory of Its Kind in the United States.

Proprietors of the
Celebrated
Mount Savage Fire Brick.
GOVERNMENT STANDARD.

Home Office and Works: MOUNT SAVAGE, Allegany County, Maryland.
Branch Offices: No. 1 Broadway, NEW YORK, N. Y.; Land Title Bldg., Broad & Chestnut Sts., PHILADELPHIA, PA.; Park Building, PITTSBURGH, PA.; Stowe, Fuller & Co., 249 Arcade, CLEVELAND, O.; N. A. Williams Co., 219 E. Washington St., CHICAGO, ILL.

OTIS STEEL

"OTIS" FIRE BOX PLATES A SPECIALTY.
Flange Plates, Ship Plates, Tank Plates, Steel Car Axles and Forgings of all Kinds.
Steel Castings from 100 to 75,000 lbs
Head Office and Works, CLEVELAND, OHIO.

Agencies: NEW YORK, 97 Cedar St.
ST. LOUIS, 615 N. Fourth St. WASHINGTON, Kellogg Bldg.
MONTREAL, Homer Taylor, 183 St. James St.
SAN FRANCISCO, John Woodlock, 154-156 First St.

JEROME KEELEY & CO.,
Established 1869. 421 Chestnut St., PHILADELPHIA
PIG IRON, IRON ORES AND COKE.
Consulting Engineers in Metallurgy and Mining. Steel and Iron Blooms, Muck Bar, etc

THE McKIM GASKET,
Made of packing encased in Soft Rolled Annealed Copper.
Cannot Blow Out.
Can be Reapplied Indefinitely.
Made for all sizes pipes, flanges and manhole and handhole plates for boilers.
McCORD & COMPANY,
Old Colony Building, Chicago.
100 Broadway, New York.

WELDLESS COLD DRAWN STEEL BOILER TUBES.
Atlantic Tube Co.,
PITTSBURG, PA.

Larger paid circulation and larger list of advertising patrons than ever in its history. These THE IRON TRADE REVIEW now has. Advertising in it pays.

MALLEABLE

Buhl Malleable Co.,
DETROIT, MICH.

CASTINGS.

Pittsburg is becoming known as a banking and money center as well as a manufacturing point. Its Stock Exchange is the market for most of the iron and steel securities.

Robert C. Hall,
Member of the Pittsburg Stock Exchange,

will be pleased to secure information or make transactions in these stocks at any time. Phone Court 3613 or 345 Fourth Ave., PITTSBURG, PA.

ore cars. The cars for the Chesapeake & Ohio are similar to the 600 cars built for them by the same company some time ago. For the past three months the output of the company's plants has averaged 100 steel cars every working day.

The men employed in the structural mills of Jones & Laughlins, Ltd., have been offered shorter hours with the understanding that there is to be no organization. The shorter hours only affect the tonnage men.

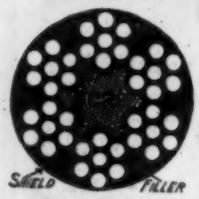
The stockholders of the Hussey Steel Co. of Pittsburg, whose plant is located at New Kensington, Pa., have decided to increase the capital stock from $150,000 to $250,000.

The National Car Wheel & Foundry Co. of Allegheny, Pa., has just completed improvements that have cost upward of $40,000. A large new machine shop has been built and in addition a 32-foot embankment has been built to prevent the waters from the Allegheny river flooding the plant during stages of high water.

The Ft. Wayne Railroad Co. will let contracts for 7,000 tons of rails on June 10. The rails will be used to double track the road to Chicago.

The foundations for the new 14-inch mill of the Carnegie Co. at Duquesne have been completed and the work of erecting the steel construction has been commenced. The record for the 40-inch mill at the Duquesne mill for the week ending

E. R. ALLEN
MANUFACTURER OF
All kinds of soft, fine, medium and heavy Gray Iron Castings to order. Boiler, Heater and Architectural Iron Castings a specialty.
Send for Prices and Estimates.
Corning, New York.



Preserve your Wire Ropes, Manila Ropes, Leather Belts, Gearing.
Get Catalogue L.
Ironsides Paints for Roofs, Boiler Fronts, Stacks and all metal work.
THE IRONSIDES COMPANY,
Columbus, O., U. S. A.

We have in stock, new, ready for shipment:—
One Self-contained Geared Hoist, for steam or air power, very compact, suitable for dock, vessel or mine.
Will hoist 1100 lbs. 490 ft. per minute
Drum fitted with clutch and will hold 3000 ft. of ½-in. rope.
One Hoist, same as above in all respects, ready for shipment in one week.
One Self-contained Geared Hoist, for steam or air power, very compact, suitable for dock or vessel.
Will hoist 1700 lbs. 540 ft. per minute.
Drum fitted with clutch and will hold 1500 ft. of ⅝-in. rope.
Write for details and special prices.
WEBSTER, CAMP & LANE MACHINE CO., Akron, Ohio.

Conestoga Building, EDWARD E. ERIKSON, PITTSBURG, PA.
Regenerative Gas Furnaces and Water Seal Gas Producers.
Produces Gas under Tubular Boilers, saving 20 per cent in fuel. NO SMOKE.

The man who whispers down a well,
About the things he has to sell,
Won't reap the golden dollars,
Like one who climbs a tree and—hollers.—Ex.

THE OAK HILL FIRE BRICK & COAL CO.,
BRANDS:
O. K. CROWN.
O. K.
A.
Manufacturers of Fire Brick of all qualities, shapes and sizes, suitable for Furnace Linings, Stove Linings, Cupola Linings, Rolling Mills, etc.
Correspondence Solicited.
Prices quoted upon application.
WORKS:
OAK HILL, OHIO.

PHOENIX HORSE SHOES—ARE THE BEST HORSE SHOES MADE
CATALOGUE SENT ON REQUEST.
PHOENIX HORSE SHOE CO., POUGHKEEPSIE, N. Y.—JOLIET, ILL.

The Champion Rivet Co.,
CLEVELAND, O., U. S. A.

Victor Boiler and Structural Rivets
FINISH UNEXCELLED. QUALITY HIGHEST STANDARD
GOVERNMENT WORK A SPECIALTY.

LIGHT GREY IRON CASTINGS.
SOFT, STRONG AND TRUE TO PATTERN.
Facilities Unequaled by any in the West. Quality Guaranteed.
WESTERN MALLEABLE & GREY IRON MFG. CO.,
139 Burrell Street, - - MILWAUKEE, WIS.

May 26 exceeds all previous efforts. The production aggregated 6,709 tons, as compared with the greatest weekly previous record of 6,196 tons.

General Industrial Notes:—

The R. D. Wood Iron Co. of Camden, N. J., filed an application with the board of assessors of that city with a view of securing a reduction in the assessment on the plant. The present assessed value of the plant is $300,000. Walter Wood, president of the company to support his claim for a reduction, presented a statement that the plant is not worth $165,000.

A 60-inch plate mill will be erected at the New Philadelphia, O., plant of the American Sheet Steel Co., to take the place of the bar mill which has just been dismantled.

No. 1 open-hearth plant of the Pennsylvania Steel Co. at Steelton, Pa., which has been rebuilt has been placed in operation. The 25-ton furnaces have been enlarged to 50-ton capacities and have been changed from the acid to the basic process.

The Sharon Boiler Works of Sharon, Pa., have granted their boiler makers a shorter work day and an increase in wages. The men will hereafter work nine hours per day instead of ten.

The new sheet mill of the Niles Iron & Sheet Co., located just outside of Niles, O., on a desirable tract of 25 acres, between the Pennsylvania and B. & O. railroads, was placed in operation last week, and is now making Bessemer sheets. The plant consists of four hot mills, two cold mills and a 25-inch bar mill for rolling sheet bars. The mills are operated by twin Corliss engines, 38x60-inch cylinders and steam is furnished by a battery of Stirling boilers, with a capacity of 1,000-

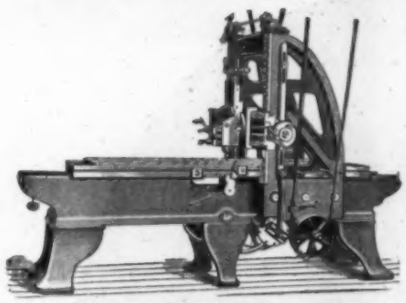
MACHINE TOOLS

TRADE MACHINERY MARK

LARGE STOCK FOR IMMEDIATE DELIVERY.

High Grade Labor Saving Machine Tools.

NEW AND SECOND HAND.



U·BAIRD MACHINERY CO.
123-125 WATER ST.
124-126 FIRST AVE.
PITTSBURGH PENNA U·S·A·

TRADE PAPER ADV. AGCY. N.Y.-E

h. p. The main building is of steel, 250x134 feet. The equipment includes an electric traveling crane. Already 250 men have been given employment in the new plant. The company is capitalized at $200,000 and is composed of Niles and Youngstown, O., capitalists. James S. Patterson, formerly with the Struthers Iron & Steel Co., is president and general manager of the company: H. M. Robinson, vice-president; W. A. Thomas, secretary and treasurer.

The West and Northwest:—

The Otis Elevator Co., Chicago, has received the contract for the installation of the passenger elevators in the Frick Building which is being erected in Pittsburg by the George A. Fuller Co. of Chicago. The contract, which is said to be the second largest contract for passenger elevators awarded this year, includes the equipment of ten elevators, which will be arranged in two banks of five each in the main rotunda of the building. In addition to these there will be installed a freight elevator and a system of sidewalk lifts and ash hoists. The Ellithorpe air cushion system will be adopted to prevent accidents, and to install this system it will be necessary to excavate a pit 63 feet below the street level.

The American Malleable Casting Co., Chicago Highlands, Ill., has been incorporated with a capital stock of $300,000. The incorporators are I. L. McCord, F. E. Lonas and L. J. Highland.

S. G. Taylor & Sons, Chicago, has taken out incorporation papers to manufacture iron and steel, with a capital stock of $40,000. The incorporators are James E. Randall, John E. Hillon and Milton P. Randall.

The Northwestern Mfg. Co. of Duluth, Minn., has purchased the business of the Northwestern Supply Co. and last week commenced operations at the plant which has been shut down for several months. The plant was formerly known as the Clyde Iron Works.

The Otis Elevator Co., Chicago, has received a contract for the installation of five elevators in the Minneapolis Chamber of Commerce. They will be of the high pressure, plunger type, with a speed of 450 feet a minute.

The Reliance Gauge Column Co. of Cleveland, O., has opened an office at 79 Lake St., Chicago, with H. B. Rose as Western agent.

The Milwaukee Forge & Iron Co., Milwaukee, Wis., is erecting a new plant in the Kinnickinnic Valley. The machine shop will be 192x60 feet, the forge shops, 232x60 feet, with a north wing, 187x60 feet, and a south wing, 183x60 feet. The Milwaukee Boiler Co. will furnish the boilers, Pawling & Harnischfeger, a 30-ton electric crane, and the Wisconsin Bridge Co. has the contract for the steel work.

The Ellington Mfg. Co., Quincy, Ill., has been incorporated to manufacture machinery and tools with a capital stock of $150,000. The incorporators are George Wells, Herman Heidereder and W. T. Dwire.

The Dings Electro-Magnetic Separator Co., Milwaukee, Wis., has shipped a brass separator to the Kennedy Valve Co., Coxsackie, N. Y.

Filer & Stowell Mfg. Co., Milwaukee, Wis., has received an order from the Inland Steel Co., Chicago, for two 34x60 Corliss engines to be direct-connected to the rolls.

Winslow Bros. Co., Chicago, has been awarded the contract for the ornamental iron work in the 20-story building which is being erected at Pittsburg by George A. Fuller Co., Chicago, for H. C. Frick. The contract includes the ornamental bronze work of the main entrances and staircases, elevator enclosures and area rails, interior iron and bronze work in the windows in the lower stories, and also the installation of a complete system of automatic control of the elevator entrances.

Gardner & Robinson, 1522 Monadnock Block, Chicago, announce that they are now in position to furnish all kinds of heavy steel plate work, including tanks, draught stacks and blast furnace work; also ore, cinder and hot metal buggies, etc. This material will be manufactured for them by the Enterprise Boiler Co. of Youngstown, O., which concern they represent in Chicago territory.

INDIANA.

Let him who chance to read this rhyme
Just give one moment of his time
To meditate, on the Qualities Sublime
Of "INDIANA."
We promise you 'twill not be ill spent.
You ne'er your time to better purpose lent,
Nor thoughts on subject more interesting bent,
Roam where you will all o'er the land,
Than to dwell forever on the merits of our
No. 5 INDIANA SAND.

FINE = =

STRONG

MASTER VAN DYE,
Our Commercial Tourist,

Begs to introduce to you our

No. 5 INDIANA SAND,

SUPERIOR TO ANY OTHER FOR

Brass Castings, Fine Hardware and Malleable Work.

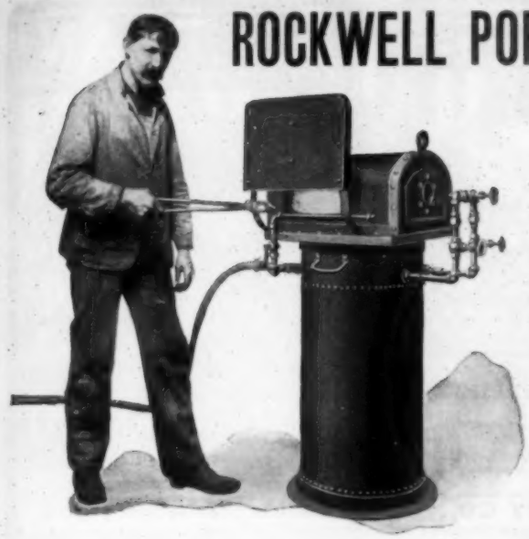
Sold Exclusively by—

The Newport Sand Bank Company

NEWPORT, KENTUCKY.

CHICAGO OFFICE, 113 ADAMS STREET. Phone Central 2791.

ROCKWELL PORTABLE OIL RIVET FORGE



This Forge Carries a High Uniform Heat, Always Under Control of the Operator.

Rivets Always in Plain Sight, Quickly Heated and Easily Reached.

Uses Either Fuel Oil, Kerosene or Gasoline.

Will Heat 500 Rivets per Hour.

Can also be Used for Light Forging, Hardening, Tempering and Annealing.

Is Operated with Compressed Air at 15 lbs. Pressure or Higher.

Amount Air Required, 20 Cubic Feet per Minute.

Indispensable in connection with Pneumatic Riveters.

ROCKWELL ENGINEERING CO., 26 Cortlandt St., NEW YORK.

LIDGERWOOD CABLEWAYS

Manufactured Under 21 Patents.

HOIST AND CONVEY LOADS UP TO 20 TONS
FOR THE CONSTRUCTION OF DAMS, PIERS, WALLS, SEWERS, CANAL EXCAVATING, ETC.
Send for book, "Lidgerwood Cableways."

STEAM AND ELECTRIC HOISTS. LIDGERWOOD MFG. CO. 96 Liberty St., NEW YORK.

Malleable Iron Buckets of Approved Pattern and Weight.

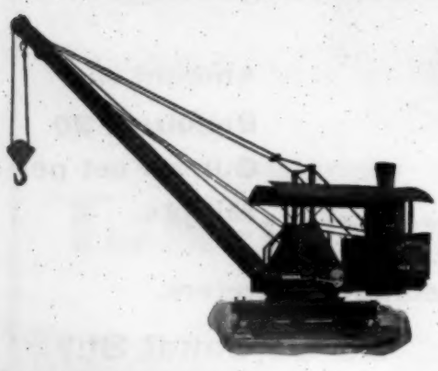
LINK-BELT Elevators and Conveyors.
for handling Slabs, Billets, Bar Iron, Coal, Ashes, Cement, etc Shafting, Pulleys, Patent Machine-moulded Rope Sheaves, Clutches, etc.
LINK-BELT MACHINERY CO.,
ENGINEERS, FOUNDERS, MACHINISTS.
Chicago, U. S. A.
LINK BELT ENGINEERING CO., PHILADELPHIA and NEW YORK.

NORTHERN ENGINEERING WORKS,
No. 6 Chene St., DETROIT, MICH.
Cleveland Office: C. E. STAMP & CO New England Building.
CRANES—ALL TYPES.
Traveling, Jib, Locomotive—Power or Hand.
Write us stating requirements.

CRANES •HIGH•SPEEDS• •ELECTRIC•STEAM•HAND• •MACHINERY FOR HANDLING COAL AND ORE
THE BROWN HOISTING MACHINERY CO. Works, Cleveland, O.
NEW YORK, 26 Cortlandt Street. LONDON, 39 Victoria Street, S. W.

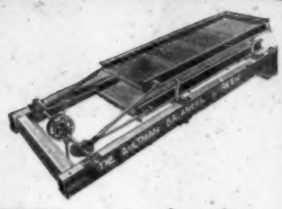
The Exeter Machine Works,
PITTSTON, PA. NEW YORK OFFICE: 15 CORTLANDT ST.
Manufacturers of
Hoisting Engines For Contractors and Mines.
Elevators and Conveyors For Power Houses, Coal Yards and Mines.

THE CLEVELAND CRANE AND CAR CO
CRANES OF ALL KINDS FOR ALL PURPOSES
SUPERIOR ST. CLEVELAND O.



Locomotive Cranes
IN CAPACITIES
Three to Fifty Tons
INDUSTRIAL WORKS
BAY CITY
MICH.

AULTMAN



WE equip foundations and factories with the ELEVATING, CONVEYING and SCREENING MACHINERY now necessary to the economical production of small, or duplicate work. For further information address
The AULTMAN COMPANY,
CANTON, OHIO.

AULTMAN

Steel Works and Rolling Mill Engineers.

Garrett-Cromwell Engineering Co.,
New England Building,
CLEVELAND, OHIO.

When writing to advertisers, kindly mention this paper.

PERFORATED METALS

PERFORATED IRON, STEEL, COPPER, BRASS, TIN, ZINC, LEAD, ETC. MADE TO ORDER

LARGE & VARIED ASSORTMENT OF SIZES

CORRESPONDENCE SOLICITED

THE ROBERT AITCHISON PERFORATED METAL CO.
303-305 DEARBORN ST. CHICAGO, ILL.

PERFORATED PLATE SCREENS
AS REQUIRED FOR
STONE, ORE, ZINC, LEAD, and all Railroad and Mining Uses.
Special Screens for COAL and COKE.
THE HENDRICK MFG. CO., LTD.,
Samples and information upon request.
Carbondale, Pa.

SCIENTIFIC MFG. CO.,
The Rookery,
CHICAGO.

COMMERCIAL DECALCOMANIAS

THE RETORT COKE OVEN CO.
Engineers and Contractors for
RETORT COKE OVENS,
With or Without Recovery of By-products.
JOHN F. WILCOX, Gen. Mgr. and Chief Engineer.
General Offices: New England Bldg., CLEVELAND, O.

JULIAN KENNEDY, ENGINEER,
PITTSBURG, PA., U. S. A.
Machinery for the economical
PRODUCTION OF IRON AND STEEL.
Consultations and expert work in
GENERAL ENGINEERING PRACTICE.
Cable address "ENGINEER PITTSBURG."

The Wellman-Seaver Engineering Co.,
CONSULTING AND CONTRACTING ENGINEERS.
NEW ENGLAND BLDG., CLEVELAND, O., U. S. A.
CABLE ADDRESS "WELLSEA" CLEVELAND.
Steel Works, Rolling Mills, Metallurgical Furnaces, Manufacturing Buildings, Machinery for the most economical handling of all kinds of material.
Sole manufacturers of FORTER WATER SEALED REVERSING VALVES and FRASER-TALBOT MECHANICAL GAS PRODUCERS.
LONDON OFFICE: 47 VICTORIA STREET, WESTMINSTER.

Blast Furnaces
Constructed
with
Automatic Filling Apparatus.
Require no Top Fillers.
WALTER KENNEDY,
ENGINEER,
611 Penn Ave., PITTSBURG, PA.

THE GIRARD BOILER & MFG. CO.,
Successors to UNITED BOILER CO.,
GIRARD, - - - - - - OHIO.
Tanks, Boilers, Rolling Mill and Blast Furnace Work a Specialty.
PHONE No. 187. Send for Estimates.

Alex Laughlin & Co.,
Engineers and Contractors.
702-706 Lewis Block,
PITTSBURG, PA.

DAVID LAMOND,
Contracting Engineer,
Ferguson Block, - PITTSBURG, PA.
Blast Furnace Construction.
Agent for C. H. Foote Patent 3 and 4 Pass Fire Brick Stove.

The Iron Trade Review is the best trade advertising medium in the Central West.

Has the largest paid circulation in its territory.

WRITE FOR RATES.

When writing to advertisers, please mention the Iron Trade Review.

Strictly Chemically Pure Acids and Aqua Ammonia,

ESPECIALLY ADAPTED TO LABORATORY WORK.

MANUFACTURED BY

THE GRASSELLI CHEMICAL COMPANY,

General Office and Principal Works, CLEVELAND, O., U. S. A.

STOCKS AT

Tremley, N. J., New York Office, 63-65 Wall Street.
St. Louis, Mo. Cincinnati, O. Milwaukee, Wis. St. Paul, Minn.
Beaver Falls, Pa. East Chicago, Ind. Birmingham, Ala.
Philadelphia, Pa.: Wm. M. Wilson's Sons, 225 Dock Street.
Baltimore, Md.: James Thurston, 210 Buchanan's Wharf.
Chicago, Ill.; James H. Rhodes & Co., 42-44 Michigan Ave.

CRUCIBLE CAST TOOL STEEL.

LA BELLE STEEL CO., PITTSBURG.

"ECLIPSE" COLD DRAWN SHAFTING.

FITZSIMONS & CO., CLEVELAND.

COLD ROLLED STRIP STEEL.

MORRIS & BAILEY STEEL CO., PITTSBURG.

BYRON H. WHITE, WESTERN SELLING AGENT.

68-70 SOUTH CANAL STREET, CHICAGO.

SOLID

SHEAR KNIVES

SAMUEL TRETHEWEY & CO. LTD.

PITTSBURG, PA.

ESTABLISHED 1883

Drake's Adjustable Burner

Can be turned down from a full size flame to one candle power by means of the little valves, one of which may be closed entirely and the other one reduced to a flame as small as desired for a night light without smoking, carbonizing or producing a sluggish flame.

The diverging stems are so arranged that they can be turned into alignment in an instant.

The points of the little valves may be forced up through the little hole where the gas is liberated from the rear, removing any obstruction without being obliged to extinguish the whole flame.

Patents pending in the United States, Canada and Principal Countries of Europe.

Manufactured and For Sale only by the

DRAKE ACETYLENE APPARATUS CO.,

Or Its Agents,

32 Hathaway St., CLEVELAND, O., U. S. A.

Le Chatelier's

PYROMETER

For measuring temperatures between 0 and 2,900° F.

Recommended by the Highest Authorities.

Successfully used in establishments for the manufacture of

Gas, Chemicals, Sugar, Terra Cotta, Stone Ware, Porcelain, Chamotte, Cement, Accumulators, Incandescent Lamps, Cartridges and Ammunition, Glass,

Iron and Steel, Malleable Iron.

Also by Boiler Inspectors, Schools and Colleges, for hardening and annealing steel in roll foundries, etc.

VULCAN MFC. CO., Ltd.,

Pittsburg, Pa.

Station A.

HIGH GRADE GRAY IRON AND SEMI-STEEL CASTINGS

For Hydraulic Presses and other high pressure work.

SALAMANDER IRON

For resisting heat, guaranteed to stand fire test three times greater than ordinary gray iron.

Electrical Castings of Guaranteed Magnetic Power

BROKEN MACHINERY WELDED.

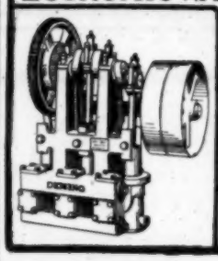
Davis & Ludwig Foundry Co.

240-256 Root Street, - CHICAGO, ILL.

TRIPLEX PUMPS

PROVIDE

ECONOMIC WATER SUPPLY.



OPERATED BY GAS ENGINE ELECTRIC MOTOR etc.

THE DEMING CO. MAKERS OF PUMPS FOR ALL PURPOSES SALEM OHIO.

HENION & HUBBELL GENERAL WESTERN AGENTS 61-69 NORTH JEFFERSON ST. CHICAGO, ILL.

Tropenas Department

Steel Castings,

25 LBS. AND UNDER.

Estimates given on not less than 100 from each pattern.

THE SARGENT CO.,

687 Old Colony Bldg., CHICAGO.

MONONGAHELA IRON & STEEL CO.,

Manufacturers of

Charcoal Bar Iron **CARTER BRANDS** Charcoal Iron Chain

ALL SIZES.

United States Government Specifications Guaranteed. PITTSBURGH, PA.

LIGHT STEEL AND REFINED MALLEABLE IRON

CASTINGS OF EVERY DESCRIPTION.

True to Pattern. Superior Quality. Uniform Structure. Great Strength.

NORWAY IRON & STEEL CO., - - YORK, PA.

M. ALLEN, President.

WM. B. FRANKLIN, Vice-President.

F. B. ALLEN, Second Vice-President.

J. B. PIERCE, Secretary and Treas.

HARTFORD STEAM BOILER INSPECTION AND INSURANCE CO. HARTFORD, CONN.

BURWELL & BRIGGS, General Agents, 32 and 33 Clark Bldg., 208 Superior St., Cleveland, O.

C. A. BURWELL, Chief Inspector, 32 and 33 Clark Bldg., 208 Superior St., Cleveland, O.

J. H. WOLCOTT, Special Agent, 32 and 33 Clark Bldg., 208 Superior St., Cleveland, O.

Cleveland, Lorain & Wheeling,

Railroad Company.

TIME SCHEDULE.

Southbound, (down). (up). Northbound.
January, 1901.

15	13	11	Lorain Branch	10	14	16
P.M.	P.M.	A.M.		P.M.	A.M.	P.M.
4:00	1:05	7:00	Lorain	3:32	12:02	7:15
4:18	1:25	7:20	Elyria.....	3:14	11:45	6:59
4:36	1:53	7:43	Grafton	2:56	11:29	6:41
4:58	2:15	8:05	Lester Jun...	2:32	11:08	6:21

5	3	1	Main Line.	2	4	6
P.M.	P.M.	A.M.		A.M.	A.M	P.M.
5:10	1:35	7:50	Cleveland.....	9:50	12:00	6:00
6:20	2:31	8:27	Lester Jun...	8:48	11:07	5:00
6:31	2:40	8:36	Medina	8:36	10:59	4:48
6:54	2:59	8:57	Seville	8:14	10:40	4:26
7:00	3:04	9:03	Sterling	8:03	10:34	4:20
7:22	3:24	9:24	Warwick.....	7:41	10:13	3:56
7:30	3:32	9:31	Canal Fult'n	7:34	10:06	3:48
7:50	3:50	9:50	Ar. Dep. Massillon.	7:15 8 P.M.	9:50	3:30
7:50	3:50	9:50	Dep. Ar.	7:50	9:50	3:30
8:05	4:06	10:05	Justus.....	7:34	9:35	3:13
8:35	4:37	10:36	Canal Dover	7:03	9:05	2:44
8:42	4:44	10:43	New Phila....	6:55	8:58	2:37
9:00	5:01	11:00	Ar. Dep. Urichsville	6:38	8:40	2:20
7 A.M.						
7:30	5:10	11:10	Dep. Ar.	6:38	8:40	2:20
8:06	5:43	11:42	Freeport	6:00	8:06	1:44
		P.M.				
8:32	6:07	12:05	Flushing	5:34	7:42	1:20
9:40	7:05	1:05	Bridgeport...	4:30	6:45	12:20

All of above trains daily except Sundays.
Sunday train leaves Urichsville 6:10 a.m., arrives Cleveland, 9:50 a. m.
Sunday train leaves Cleveland 6 p. m., arrives Urichsville 9:35 p. m.
Electric cars between Bridgeport, Bellaire Martins Ferry and Wheeling.

M. G CARREL, General Passenger Agent.

When you write to firms advertised in our columns, please mention the fact that you took their address from our paper. They will thank you for it.

FOR GREAT TENSILE STRENGTH, ELASTICITY AND ELONGATION, COUPLED WITH UNUSUAL NON-CORROSIVE QUALITIES.

Castings and Propeller Wheels

Made from

PARSONS MANGANESE BRONZE

Cannot be excelled. Write for Particulars.

SOLE MAKERS

THE WILLIAM CRAMP & SONS'

Ship and Engine Building Company,

PHILADELPHIA, PA.

The I. & E. Greenwald Co.

Engineers,
Founders and Machinists.

Steam Engines, Shafting, Hangers, Pulleys, Sprockets Wheels, Chains, Etc., Etc.

Headquarters for Mill Gearing of all kind and sizes.
Steam Power Plants complete.

720 East Pearl Street.,
CINCINNATI, O.

The Geo. B. Sennett Co., Youngstown, Ohio

MANUFACTURERS OF

Sennett Compression Coupling

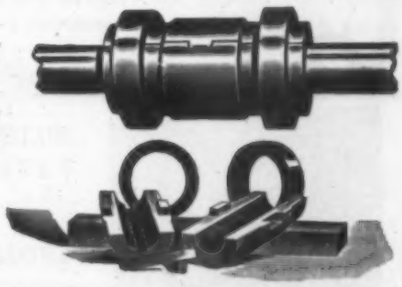
And Other Specialties.

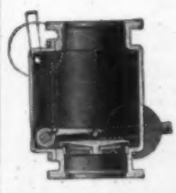
We do not claim novelty in these Couplings so much as good material, good workmanship and extreme simplicity. We make them of a very strong cast iron, with wrought iron bands.
We make also the

SENNETT ENGINE

20 to 40 H. P.

Foundry contracts solicited for duplicate castings, from 10 lbs. to 5 tons each





Excelsior Straight-Way Back Pressure Valve

This valve has no dash pots, springs, guides or complicated levers to get out of order. It is simple, reliable and well made Never sticks, and can be relied upon at all times when using exhaust steam for heating; or when used as a relief, or free exhaust on a condensing plant, it has no equal. It is noiseless and free from any complicated attachments.

JENKINS BROTHERS, NEW YORK, PHILADELPHIA, BOSTON, CHICAGO

DIXON'S SILICA GRAPHITE PAINT

FOR TIN OR SHINGLE ROOFS AND IRON WORK. IT IS ABSOLUTELY WITHOUT AN EQUAL. Tin roofs well painted have not required repainting for 10 to 15 years.

If you need any paint it will pay you to send for circular.

JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.

When writing to advertisers please mention The Iron Trade Review.

BEST MANUFACTURING CO., Pittsburg, Pa.

GULLAND { Best Gate / REGULATING / REDUCING / Heston Blowoff **VALVES**

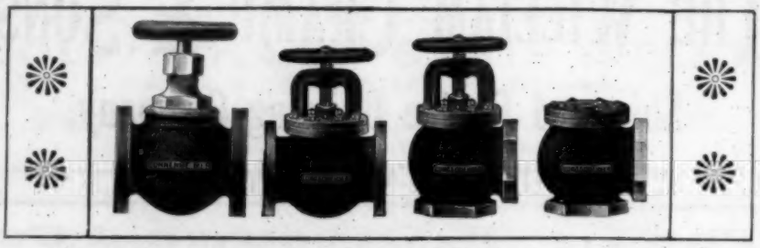
High Pressure PIPING for POWER PLANTS ERECTED COMPLETE In all parts of the world.

GUN IRON, SEMI-STEEL, AIR FURNACE **CASTINGS** STEEL, BRASS AND CLIMAX BRONZE.

Write for Book R.

THE LUNKENHEIMER IRON BODY, BRASS MOUNTED GLOBE, ANGLE CROSS AND CHECK VALVES

are made of best materials and fully warranted. Made in screw and flange ends from 2 inches up. Endorsed and specified by intelligent steam users everywhere. Write for catalog of superior brass and iron engineering appliances.



THE LUNKENHEIMER CO.,

Main Offices and Works, Cincinnati, O., U.S.A.

BRANCHES—26 Cortlandt Street, New York. 35 Great Dover Street, London, S. E.

CLEVELAND PNEUMATIC TOOLS

have been designed to meet all the requirements that may be made of pneumatic tools.

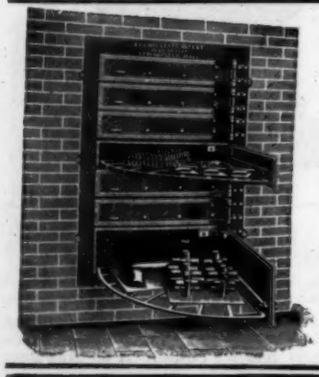
They are strong and well made. They combine all the good points of tools longer on the market and have none of their faults.

Our CLEVELAND LONG STROKE RIVETING HAMMER does the most rapid work of any tool made, and it does not pay frequent visits to the repair shop. Let us send you one on trial.

THE CLEVELAND PNEUMATIC TOOL CO.,

74 Frankfort St., Cleveland, O., U. S. A.

RUSSELL & FOWLER - CLEV'D. O.



MILLETT'S PATENT **CORE OVEN**

No one who makes small cores can afford to be without it. . .

Double Doors, One closing the oven when the other is open.

Saves Fuel, Saves Time.

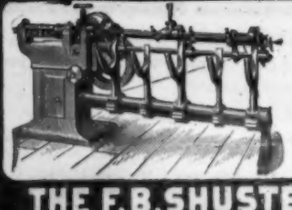
SEND FOR CIRCULAR.

MILLETT CORE OVEN CO. Brightwood, Mass.

The ovens can be seen in the sample rooms of the S. Obermayer Co., either in Cincinnati or Chicago, and in the show rooms of J. W. Paxson & Co., Philadelphia.

England Agents: J. W. JACKMAN & Co., 39 Victoria St., London, S. W.

AUTOMATIC WIRE STRAIGHTENING, CUTTING & FORMING MACHINES.



LONG CUT.

Straightening and cutting directly from the coil 150 feet per minute.

All kinds of automatic machinery used in the manufacture of hardware, bicycles, saddlery hardware, cutlery metal and wire goods, etc., etc.

Manufactured by

THE F.B.SHUSTER CO., NEW HAVEN, CONN

Mark your tools with a Steel Stamp

OHIO F. A. SACKMANN. 34 PROSPECT ST. CLEVELAND, OHIO.

Send for Price-list No. 12.

PYROMETERS

Edward Brown,

ESTABLISHED 1860.

311 WALNUT St., PHILADELPHIA

Manufacturer and Patentee OF THE

Hot Blast (or Graphite) Pyrometer.—The only stationary Pyrometer now in use durable over 700 degrees.

The Standard Portable Pyrometer—For Blast Furnaces.

Mercury Revolution Indicator.—Centennial Exhibition Medal. Accurate for all time.

Annealing Oven Pyrometer—to 3,000 degrees—of 1893.

Tin-plating Pyrometer—of 1894.

Mercury and Steam Gauges.

BERGER'S METAL CEILINGS

Deepest stamped. Most artistic. The only ones in Classified Designs. Write to-day for details. THE BERGER MFG. CO., Canton, O.

THE

DAILY METAL MARKET REPORT

Published by

THE REPORT CO.,

Room 79, 99 John St., New York.

Gives daily reports of foreign and domestic metal markets. Shows daily fluctuations in all metals, both in this country and in Europe. Contains the latest ews affecting the market for Pig Iron, Steel, etc. Write for sample copy. We guarantee a circulation greater than the combined circulation of all competitors. As an advertising medium for reaching the Iron, Steel and Metal producers and consumers it has no superior.

ARMSTRONG MAN'F'G. CO.

WATER GAS AND STEAM FITTERS TOOLS

BRIDGEPORT, CONN.

New York Office, 139 Center Street.

The well merited reputation attained by our goods is our guarantee of their superiority. If you cannot get them of your dealer send to us for catalogue and prices.

FORBES PATENT DIE STOCK

FOR HAND OR POWER,

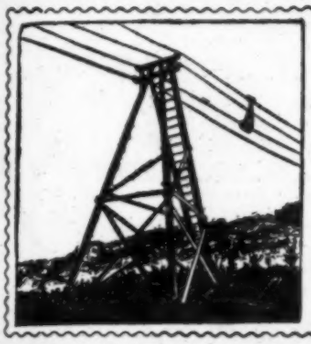
Occupy less floor space, require less power to run, more simple of construction, far cheaper than any other machine of same range.

Send for Illustrated Catalogue.

MANUFACTURED BY

THE CURTIS & CURTIS CO.,

37 Garden St., - - BRIDGEPORT, CONN.



Leschen Co.'s Patent Aerial

WIRE ROPE **TRAMWAY**

ALSO

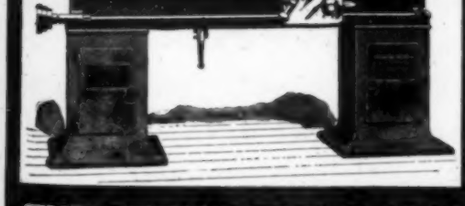
WIRE ROPE For Hoisting, Haulage, Transmission, etc. . . . . .

Manila and Sisal Rope and Blocks.

A. LESCHEN & SON ROPE COMPANY,

920-922 N. First St., ST. LOUIS, MO.
92 Center St., NEW YORK, N. Y.
47-49 South Canal St., CHICAGO, ILL.

IMPROVED 18 INCH×6 FT CABINET TURRET LATHE (OR FOX MONITOR.)



Many good THINGS about this machine told in *Circular*.

Write us.

THE SPRINGFIELD MACHINE TOOL CO.
SPRINGFIELD, OHIO, U.S.A.

Standard Sand & Foundry Supply Co.,

Phone, East, 896. Office and Warehouse, Mason & Belden Sts., CLEVELAND, OHIO.

Manufacturers, Operators and Shippers of

NEW PROCESS AND ALL GRADES OF MOULDING SANDS.

Dealers in T. P. KELLY & CO.'S Foundry Facings. SCIOTO CO.'S Fire Brick. Fire Clay and General Foundry Supplies. Sand Banks at Everett, Ohio.

The Elastic Nut Track-Bolt

makes the best and cheapest rail-fastening. NUTS NEVER WORK LOOSE. Requires no nut-lock. Our Elastic Self-Locking Steel Nut always stays, and is superior for use on Cars, Track, Bridges, Machinery etc. Write us for prices on Sq. and Hex. Nuts, (Elastic or Common) Machine Bolts, Track Bolts, Rivets, etc.

NATIONAL ELASTIC NUT CO.,
MILWAUKEE, WIS.

Machinery For Reducing and Pointing Wire By Compression or Cold Swaging.

Especially adapted to Pointing Wire Rods and Wire for Drawing. For machines or information, address

S. W. GOODYEAR,
Waterbury, Conn.

COVERT MFG. CO.,

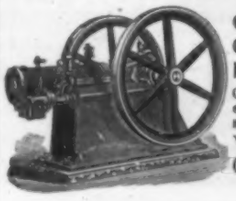
West Troy, N. Y.

"Yankee" Snaps

Made in Styles and Sizes.

For Sale by Jobbers at Manfrs. Prices.

COVERT MFG. CO., West Troy, N.Y., U.S.A.



GAS AND GASOLINE ENGINES.

Cheap and convenient power for any service.

Write for catalogue

COLUMBUS MACHINE CO.
COLUMBUS, O.

The Cleveland Terminal & Valley R. R. Co.

(B. & O. System.)

Depot foot of So. Water St. City Office 241 Superior St.	Arrive.	Depart.
Valley Jctn. & Way Stations...	°6:20 P M	°7:15 A M
Wheeling & Chicago.....	°9:25 P M	†7:15 A M
Akron, Canton, Pbg., Wash..		
Balto., Phila., & New York..	°8:10 A M	°11:20 P M
Akron, Canton, & Valley Jct....	°10:00 A M	°3:25 P M
Akron, Canton, & Chicago.....	°8:10 A M	°6:30 P M
Akron, Canton, & Marietta.....	†2:10 P M	†11:00 A M
Akron, Wash., & New York...	°10:45 A M	°3:00 P M

† Daily except Sunday. ° Daily. Pullman's Palace Vestibule sleeping cars between Cleveland and Chicago; also Washington, Baltimore, and Philadelphia.

...A B C OF IRON..

A book for foundrymen. It is issued in cloth binding, and gives much valuable matter on how to reduce cost of mixtures, and on grading and numbering of pig iron.

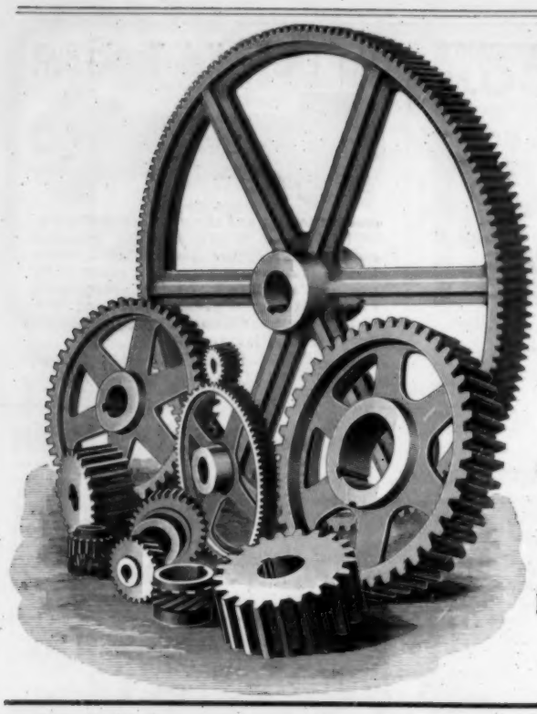
CHAPTER HEADINGS:—Iron—What is it? Pig Iron. Constituents of Iron. Numbering of Pig Iron. Grading of Iron. How to reduce cost of mixture. Steel, Physical Properties of Metals Defined. Statistics. Early History and Manufacture of Iron.

Former Price, $2.00. NOW $1.00.

Sent, postpaid, on receipt of price, by

THE IRON AND STEEL PRESS CO.,

CHICAGO. CLEVELAND. PITTSBURG.



The Van Dorn & Dutton Co.

General Machinists and Engineers,

MANUFACTURERS OF

CUT GEARS
AND
PINIONS,

Spur Gears, Spiral Gears, Bevel Gears, Worms and Racks.

GEAR CUTTING OF ALL DESCRIPTIONS.

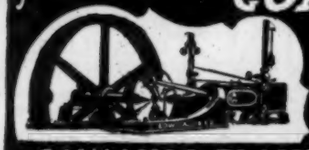
Teeth Planed in Bevel Gears Theoretically Correct by Latest Improved Machinery.

Material and Workmanship the Best. Write for Estimates and Prices

CLEVELAND, O.

The EDWARD P. ALLIS Co.

MILWAUKEE WIS. BUILDERS REYNOLDS CORLISS ENGINES



BLOWING ENGINES—HOISTING ENGINES—PUMPING ENGINES SPECIAL ENGINES FOR ELECTRIC LIGHTING—STREET RAILWAYS AND ROLLING MILLS

SAW MILL, FLOUR MILL AND MINING MACHINERY

Southwark Foundry & Machine Co.

PHILADELPHIA PA.

Porter-Allen Automatic Engines,
Blowing Engines, Centrifugal Pumps,
Weiss Counter-Current Condensers.

The William Tod Co.

YOUNGSTOWN, OHIO.

The PORTER-HAMILTON ENGINE.

Reversing Engines, Blowing Engines, Converters, Hydraulic and special heavy machinery for the iron and steel trades.

Park Building, PITTSBURG, = = Seward S. Babbitt.

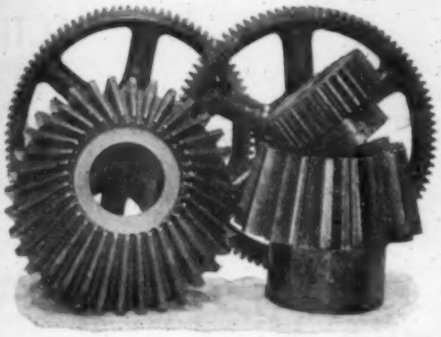
NEWS
THAT
IS NEWS.

Pointers that mean something—that tell you where bids are asked and where building materials and supplies are wanted before the news is stale. THAT is the kind of pointers WE can give you.

Contractors, Builders, Decorators, Bond Dealers, Construction Men, Manufacturers and **Supply Houses** from every part of the country testify to the superior excellence and practical value of our Advance News Reports. If you want information that will PAY YOU, write for particulars TODAY to the

Consolidated Press Clipping Co.,

159 La Salle St.,
CHICAGO, ILL.



Better Grade of Product

is the result of a machine operating smoothly and evenly—Nuttall Cut or Planed Gears are always perfectly accurate and will give perfect satisfaction under the most exacting conditions—will operate a machine with least noise and jar. Send Blue Prints or Specifications for estimate.

R D Nuttall Company
PITTSBURG, PA

GEAR CUTTING.

Spur Gears,
Bevel and Mitre Gears,
Worm Gears,
Spiral Gears,
Internal Gears.

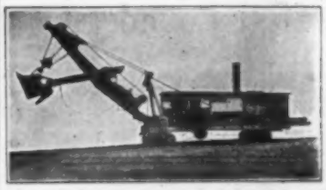
¼ to 50 inches diameter.
4 Diametral to 2 inch Circular pitch.

F. H. BULTMAN & CO.,
100-108 Canal St., CLEVELAND, O.

FORGINGS

JAS. H. BAKER MFG. CO., Pittsburg, Pa., U. S. A.

A large and growing circulation among machine shop and foundry firms, has
THE IRON TRADE REVIEW



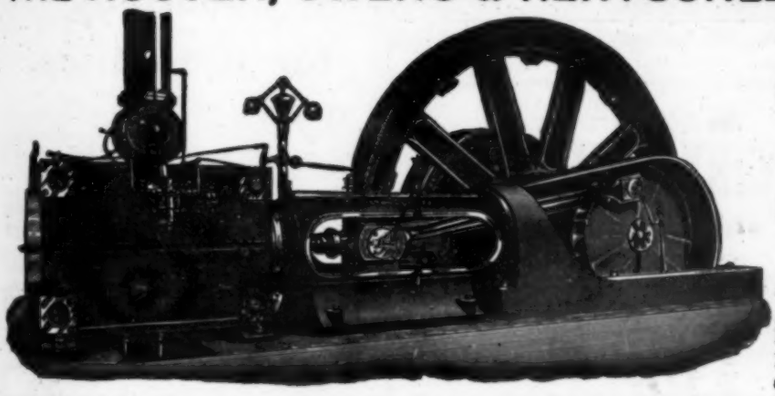
The Bucyrus Company, South Milwaukee, Wisconsin.

Steam Shovels and Dredges.

Placer Mining Machinery of the Elevator Bucket Type. Railroad Wrecking Cars and Pile Drivers. Centrifugal Dredging Pumps.

"Metallurgy of Cast Iron." Price $3.00.

THE HOOVEN, OWENS & RENTSCHLER CO., HAMILTON, O.



Hamilton Corliss Engines.

Engines for Rolling Mills, Electric Railways and Electric Light.

Engines of all sizes and for all purposes.

46 South Canal St., Chicago.
39 and 41 Cortlandt St., New York.
Lewis Block, Pittsburgh, Pa.
Room A, Laclede Bldg., St. Louis, Mo.
C. C. Moore & Co., San Francisco, Cal.

MOULDING SAND.

Let a man once get the idea his goods are good enough and you may cross him right off the map. It is the alert, progressive man who succeeds. Any Foundryman who wants to improve the face of his castings ought to try my Moulding Sand. I will send him a sample barrel without charge. If satisfactory, I will make a satisfactory price for a carload or more. It costs nothing to try it. It makes things look pretty smooth.

EVERYTHING FOR A FOUNDRY.

F. B. STEVENS, Detroit, Mich.

A. Garrison Foundry Co..

PITTSBURG, PA.

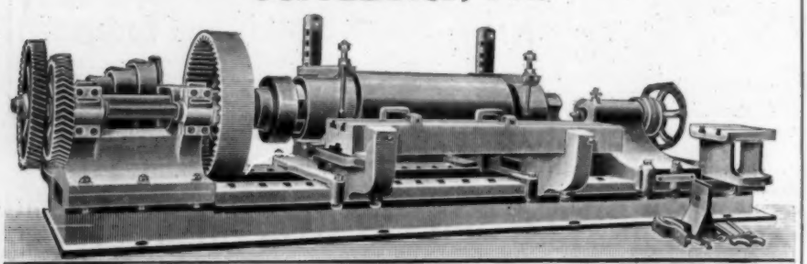
MANUFACTURERS OF

SAND and CHILLED ROLLS, and ROLLING MILL CASTINGS

of every description.

The George A. Hogg Iron & Steel Foundry Co.,

PITTSBURG, PA.



Aetna and Corliss Rolling Mill Engines, Rolling Mill Machinery, Sand and Chilled Rolls, Freeman Furnace Charger, etc.

THE LORAIN FOUNDRY COMPANY,

Lorain, Ohio.

SAND AND CHILLED ROLLS.

Heavy Iron Castings in Loam, Dry and Green Sand, Made from Cupola or Air Furnace . . .

BRASS AND COPPER CASTINGS.

Who builds the best Mine Pump?

PRESCOTT.

Fred. M. Prescott Steam Pump Co.,

MILWAUKEE, WIS.

IT PAYS TO ADVERTISE IN THE IRON TRADE REVIEW.

MODERN FOUNDRY PRACTICE.

DEALING WITH THE

Green-sand, Dry-sand and Loam Molding Processes; the Materials used; also Detailed Descriptions of the Machinery and other Appliances Employed.

With Practical Examples and Rules.

By JOHN SHARP.

English Engineering and Foundry Manager.

Throughout this work the writer's object has been to collect together in one volume the most useful information, with illustrations and discussions on every subject which it is the founder's special interest to know, so that after perusal he may be familiar with the best modern practice in his particular art. In addition the author has endeavored to make the best use of the more important matter and illustrations included in "Spretson's Casting and Founding," which the publishers have decided not to reissue. The work is divided into 30 chapters, with contents and elaborated index.

759 Pages, 259 Illustrations and 13 Folding Plates, 8vo, Cloth, $8.00.

Sent postpaid on receipt of price by

The Iron and Steel Press Co.,

1064 ROSE BUILDING,

CLEVELAND, O.

Locations for Industries.

The name of the Chicago, Milwaukee & St. Paul Railway has long been identified with practical measures for the general upbuilding of its territory and the promotion of its commerce, hence manufacturers have an assurance that they will find themselves at home on the company's lines.

The Chicago, Milwaukee & St. Paul Railway Company's 6,300 miles of railway, exclusive of second track, connecting track or sidings, traverses eight states, namely:

NORTH DAKOTA	MINNESOTA	NORTHERN MICHIGAN
SOUTH DAKOTA	IOWA	WISCONSIN
Express Passenger Trains Fast Freight Trains Throughout	MISSOURI	ILLINOIS

which comprise a great Agricultural, Manufacturing and Mining territory.

The Chicago, Milwaukee & St. Paul Railway Company gives unremitting attention to the development of local traffic on its lines and, with this in view, seeks to increase the number of manufacturing plants on its system either through their creation by local enterprise or the influx of manufacturers from the East. It has all its territory districted in relation to resources, adaptability and advantages for manufacturing. Specific information furnished manufacturers in regard to suitable locations. Address,

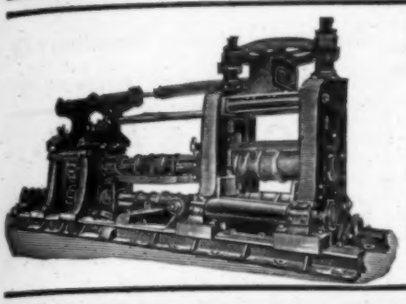
LUIS JACKSON,

Industrial Commissioner, C. M. & St. P. R'y.

Old Colony Building, Chicago, Ill.

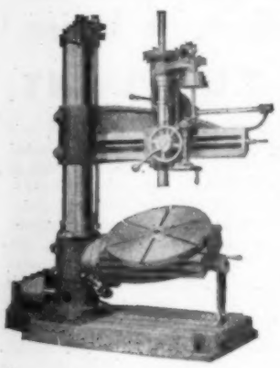
WEST PENN FOUNDRY & MACHINE CO.,
AVONMORE, PA.

Manufacturers of
TIN, SHEET AND BAR MILL PLANTS.
Blast furnace work. Steel work. Hydraulic machinery. General castings of every description.



Frank-Kneeland Machine Co.,
54th St., PITTSBURG, PA.
CHILLED, SAND AND STEEL **Rolls.**
ROLLING MILL MACHINERY.

Canton Roll & Machine Company, Canton, Ohio.
MANUFACTURERS OF
Chilled, Sand and Semi-Steel Rolls.
Rolling Mill and Tin Plate Machinery.
HEAVY CASTINGS OF EVERY DESCRIPTION.
ESTIMATES FURNISHED FOR COMPLETE PLANTS.



For Light and Medium Manufacturing

the Bickford No. o Radial has many advantages over every other machine of its class. These advantages are described in detail in our new book, "Drilling Machinery and Other Tools," a copy of which will be sent promptly on request.

We have several new types of machines on exhibition and in operation in Machinery Hall, Block 36, Pan-American Exposition. Come and see us.

THE BICKFORD DRILL & TOOL CO.,
Cincinnati, O., U. S. A.

The Emmert Vise in Four Fixed Positions.

A time saver, easily and quickly operated, strong and durable.

Write for illustrated catalog and price list.

Here's An Up-to-Date Shop Tool.
Adaptable to fourteen different positions.

EMMERT MANUFACTURING CO., Waynesboro, Pa., U. S. A.

FOR { Bridges, Factory Buildings, Oil, Gas or Water Tanks, Steel-Frame Structures, Steamships, Steamboat Hulls, Railroad Cars, Smoke Stacks, Blast Furnaces, Mill Buildings, Metallic Roofs and Wood or Metal Surfaces of any kind.

There is no protective so **Efficient, Enduring or Economical as**

WISCONSIN GRAPHITE PAINT.

IT RESISTS FROST OR HEAT, WET OR DRY, Alkalies, Acids, Sulphurous Smoke. It is an ideal protective to all exposed surfaces, and comes in all standard shades of color.

Samples furnished on application, with catalogue and prices.

Wisconsin Graphite Co.,
413 Market Street,
PITTSBURG, PA.

THE SUMMIT WIRE CO.

CUYAHOGA FALLS, OHIO.

Manufacturers of

WIRE

TINNED { BROOM WIRE, MATTRESS WIRE, LANTERN WIRE,
BRIGHT MARKET WIRE,
COPPERED MARKET WIRE,
ANNEALED STONE WIRE.

WIRE STRAIGHTENED AND CUT TO LENGTHS.

MOLDERS' TEXT BOOK.

Being Part II of American Foundry Practice, giving the best methods and rules for obtaining good castings, with detailed description for making molds. A thoroughly practical book that should be in the hands of every molder. By Thomas D. West. 460 pages, cloth $2.50

The Iron and Steel Press Co.

FRANKFORD STEEL & FORGING CO.,
Ellwood City, Lawrence County, Pa.
Office, Fidelity Mutual Bldg., Philadelphia. Chicago Office A. M. Castle & Co., 54 S. Canal St. Boston Office, Harrington, Robinson & Co., 272 Franklin St.

STEEL FORGINGS
Railroad, Marine and Machine. All Shapes. Heavy Shafting. In the rough, rough turned or finished

MACHINERY

Second-Hand—First-Class Order.

1,000-lb. Merrell board lift, automatic Drop Hammer.
800-lb. Pratt & Whitney board lift, automatic Drop Hammer.
123-lb. Poppet Drop Hammer—4 poppets.
98-lb. Poppet Drop Hammer—2 poppets.
76-lb. Poppet Drop Hammer—4 poppets.
50-lb. Drop Hammer.
25-lb. Bradley Helve Hammer.
50-lb. Dinelt & Eisenhardt Power Hammer.
200-lb. Cox & Sons Power Hammer.
45-0-lb. Bell Steam Hammer.
20-in. Barnes Drill.
20 in. Prentice Bros. Drill.
25" n. Barnes Drill, b. g. p. f., automatic stop.
2-sipindle American Valve Milling Machine.
16-in. Warner & Swasey Monitor Lathe.
No. 2 Garvin Hand Miller.
No. 3 Garvin Hand Miller, with vise and vertical fixture.
No. 3 Garvin plain Miller, with chuck, vise, and dividing head.
No. 4 Garvin plain Miller, with vise.
No. 2 Garvin Lincoln Miller, with vise.
No. 2 P. & W. Lincoln Miller, with vise.
No. 2 Cincinnati plain Miller, with vise; back-geared.
No. 2 Reed Miller, plain, back-geared with arm.
22-in. x 20-in. x 4-ft. New Haven Planer.
36-in. x 36-in. x 8-ft. Powell Planer.
No. 5 Garvin plain Miller, back-geared.
4-in. to 6-in. Curtis & Curtis Pipe Machine, hand and power.
4-in. to 6-in. Curtis & Curtis Pipe Machine, hand power.
2-in. x 4-in. Power Pipe Machine.
Dayton Swaging Machine, 1 in. capacity.
10-h. p. Motor, 500 volts.
No. 3 plain Stiles Press.
No. 4 plain Stiles Press.
No. 75 Bliss Press.
14-ft. Boiler Plate Planer.
6 in. Boynton & Plummer Shaper.
10-in. Ezra Gould Shaper.
Worcester Twist Drill Grinder, on column.
Screw Machines with and without wire feed, various capacities.
Polishing Lathes.
Emery Stands.
Engine Lathes, various swings and lengths of bed.

Write us for anything in the machinery line required, or if you wish to exchange or sell. Needing additional storage room, will endeavor to make prices that will warrant quick orders for prompt cash. No trouble to answer correspondence.

C. C. WORMER MACHINERY CO.,
20 to 36 Shelby St., Detroit, Mich.

For Immediate Acceptance and Delivery

We offer you the following second-hand machine tools, viz:

1 Fish Co. Lathe 20 x 8 ft.
1 Putnam " 20 x 16 "
1 Fifield " 26 x 14 "
1 " " 32 x 20 "
1 Howard " 46 x 18 "
1 Fifield " 44 x 26 "
1 " " 68 x 26 "
1 Crane Planer 24 x 24 x 4 ft.
1 Sellers " 24 x 24 x 6 "
1 NewHaven " 26 x 26 x 6 "
1 Sellers " 36 x 36 x 13 "
1 Pond " 36 x 30 x 13 "
1 NewHaven " 42 x 42 x 10 "
1 Putnam " 42 x 42 x 10 "
1 Pond " 48 x 48 x 20 "
1 Hepworth " 62 x 64 x 23 "
1 Prentiss Shaper, 18 in.
1 Lodge & Davis Shaper, 28 in.
1 Ohio Machine Co. Shaper, 24 in.
1 Eberhardt Drill Press, 25 in.
1 Aurora " " 28 in.
1 Bickford " " 34 in.
1 Bickford Boring Mill, 4 ft.
1 Philadelphia Boring Mill, 6 ft.
1— 45 K. W. Dynamo.
1— 7½ h. p. 110 volt Motor.
1— 15 h. p. 500 volt Motor.
1— 20 light Arc Dynamo.
1— 300 light Inc. Dynamo.
1— 700 light Inc. Dynamo.
100 Arc Lamps.

Write for our List of Engines and Boilers.

THE PELTON ENGINEERING CO.,
16 Merwin St. CLEVELAND O.

FOR SALE.

The property of the Michigan Land and Iron Co., Lim., in Upper Peninsula of Michigan. Mines, mineral rights and timber for sale. For particulars, address

THE MICHIGAN LAND & IRON CO., Lim.,
MARQUETTE, MICH.

Advertise in The Iron Trade Review.

BARS, COMMON STEEL, RIVET STEEL, ⅝, ¾, and ⅞ inch.
RIVETS, ⅝ to ⅞ inch. Made to specified lengths.
BEAMS, 4 inches to 24 inches, inclusive.
CHANNELS, 4 inches to 15 inches, incl.
ANGLES. Equal, 1¼x1¼-6x6, inc. Unequal, 2½x2 6x4, "
PLATES, ¼ inch thick and over
ZEES, 3, 4, 5, and 6 inches.

2,000 TONS IN STOCK.

All material in 50 to 70 ft. lengths, or cut to specified lengths when desired. Shipments promptly on receipt of order. Send for detail stock list.

THE FOREST CITY STEEL & IRON CO.,
Cleveland, O.

YOU

INSURE YOUR BOILER AGAINST EXPLOSIONS,

WHY not insure it against the ravages of Sulphur and Scale-forming properties in water?

We guarantee to remove all the Sulphur and 95 per cent of the Scale-forming properties before entering the boiler.

THE IDEAL SYSTEM OF WATER PURIFICATION,

INSTALLED BY THE

Pittsburg Filter Mfg. Co.,

Empire Bldg.,
PITTSBURG, PA.

Send for Catalogue and information.

MACHINERY AND ENGINES.

12-inch Bement Slotter.
52-inch Boring and Turning Mill.
36 x 36 x 16 Betts Planer.
22 x 22 x 5 Bement Planer.
Garvin (Lincoln) Milling Machine.
16 x 42 C. H. Brown & Co. Engine (fine).
10 x 24 Corliss Engine.
22 x 48 Wetherill Corliss Engine.

THE READE MACHINERY CO.,
Cleveland, O.

Now is the time for you to spread out.
Extend your business and create a demand for your devices in new fields.

FOR SALE.

SECOND-HAND TOOLS

IMMEDIATE DELIVERY.

2 12" x 5' Silk Lathes.
1 Grant Worm Hobbing Machine.
1 No. 3 Brown & Sharpe Cutter and Reamer Grinder.
1 No. 1 Diamond Universal Grinder.
1 No. 1 Mitts & Merrill Keyseat Milling Machine.
1 No. 2 " " " " "

All of the above machines are practically as good as new.

1 18" Turret Lathe.
1 Heavy Gas Engine Countershaft.
Fly Wheels, Iron and Wood Pulleys, Blowers, etc.

Also complete stock of new Machine Tools.

Brown & Zortman Machinery Co.
Cor. Water and Wood Sts., PITTSBURG, PA.

FOR SALE.

PROMPT SHIPMENT.

STEAM SHOVELS. - LOCOMOTIVES.

New or Second Hand.

1 A Marion 1½ yd. dipper.
1 A " 1¾ " "
1 55 ton Bucyrus 2 yd. dipper.
1 50 ton Vulcan 2 " "
65 and 75 ton shovels, new.
Light Saddle Tank Locomotives and Heavy Mogul, 10-wheel and Consolidation Engines, good as new.
9 x 14 and 10 x 14 Saddle Tank, new, right from factory for prompt shipment.

Write for specifications and prices.

ADAMS, LOW & COMPANY,
Empire Building,
PITTSBURG, PA.

For Sale or Lease.

STEEL PLANT,

At Birmingham, Ala., with good buildings and about five acres of ground. It is well located for water and connected with all the trunk railways. Is equipped with one 15 gross ton basic open-hearth steel furnace, electric cranes, gas producers, cupola, elevator, one large heating furnace, laboratory and fixtures, with all necessary engines, boilers, and other equipment for the manufacture of 8,000 to 12,000 tons annually of steel billets, ingots, or steel castings.

For full information, description of plant, price, and terms, call on or write

E. L. Harper & Son,
71 Broadway, New York City, N. Y.

FOR SALE.

We have purchased the entire stock of the Becher Machinery Co., consisting of:

6 Single Head, 1-inch Bolt Cutters.
7 Double Head, 1-inch "
2 Single Head, 1½-inch "
12 Extra Heads.

Above machinery will be sold in the next sixty days at bargain prices.

For further particulars address

Dodge Manufacturing Co.,
Mishawaka, Indiana.

Advertise in
THE IRON TRADE REVIEW.

HYDE WATER TUBE SAFETY BOILERS.

Best for Utilizing Waste Heat from Heating Furnaces, Puddling Furnaces, Blast Furnaces.

THE ONLY BOILERS WITH PERFECT CIRCULATION.

HYDE BROS & CO., PITTSBURGH, PA.

FIRST-CLASS MODERN FOUNDRY PLANT to Lease for a Term of Years. EQUIPMENT and a WELL ESTABLISHED BUSINESS For Sale.

Superior fire-proof building about 265x60 feet, with ample grounds and complete modern equipment nearly as good as new. Increasing demands in other manufacturing lines require the proprietors' attention. Located in a progressive city about 300 miles east of Chicago, in a thriving manufacturing center with unsurpassed shipping facilities. Parties interested in manufacturing hot water or steam heating boilers and furnaces, radiators, or general foundry work of any description will find this a most favorable opportunity. Good will of present business will more than pay expenses of operating the plant.

Address **X Y Z,**
Care Iron Trade Review, Cleveland, O.

A. M. Crane & Company,

The Rookery, CHICAGO

Manufacturers of the Simplex Car and Track Jacks, and dealers in Pig Iron, Steel and Iron Bars, Springs and Wire.

WANTED.—Second-Hand Foundry

Equipment, Cranes, Ladles, Cupolas, etc., etc.

THE J. D. SMITH FOUNDRY SUPPLY CO.,
Cleveland Facing Mill,
CLEVELAND. CINCINNATI.

WOOD SNAP FLASKS FOR IRON FOUNDRIES
IRON FLASKS FOR BRASS FOUNDRIES

LATEST AND BEST

PATENT IMPROVED RIBBED AND BEVELED FLASKS.

BRASS FOUNDERS SUPPLY CO., Newark, N. J.

Reduced Fares for Decoration Day Trips.

Persons desiring to spend Decoration Day away from home and make special trips at low rates, may purchase reduced fare tickets at ticket offices of the Pennsylvania Lines, May 29th and 30th. The return limit will include May 31st. For particulars see nearest Pennsylvania Line ticket agent.

Excursions to San Francisco via Pennsylvania Lines.

July 5th to 12th inclusive, the Pennsylvania Lines will sell excursion tickets to San Francisco, account Epworth League Convention. For particular information see Ticket Agents of Pennsylvania Lines.

E. A. SCHUBERT,
MINERAL AND TIMBER LANDS,
STOCKS AND BONDS,
COMPANIES CHARTERED & CAPITALIZED.
STEAM & ELECTRIC RAILWAYS PROMOTED.
CORRESPONDENCE INVITED.
Opera House Block, FOSTORIA, OHIO

Cleveland Union Station.
Pennsylvania Lines
Foot of Bank Street.
TICKET OFFICES at Union Station, Euclid Av. and Woodland Av. Stations.
New City Ticket Office, No. 1 Euclid Av., Cor. Public Sq.
THROUGH TRAINS RUN AS FOLLOWS BY CENTRAL TIME
*Daily. †Daily except Sunday.

*Daily. † Daily except Sunday.

From Cleveland to	Leave.	Arrive.
Pittsburg & Bellaire	†7:00 a m	†11:20 a m
Salem & Pittsburg	*8:00 a m	*8:30 p m
Salem & Pittsburg	*4:00 p m	*11:30 a m
Philadelphia & New York	*4:00 p m	*11:30 a m
Baltimore & Washington	*4:00 p m	*11:30 a m
Pitts., Bellaire & East	†1:40 p m	†6:30 p m
Baltimore & Washington	†1:40 p m	†6:30 p m
Ravenna & Alliance	*5:00 p m	*8:10 a m
Philadelphia & New York	*11:30 p m	*5:00 a m
Baltimore & Washington	*11:30 p m	*5:00 a m
Pittburg & Wellsville	*11:30 p m	*5:00 a m

Mt. Vernon & Pan-Handle Route

From Cleveland to	Leave.	Arrive.
Akron, Columbus, & Cin	*8:10 a m	*5:40 p m
Indianapolis & St. Louis	*8:10 a m	*5:50 p m
Millersburg & Columbus	†1:20 p m	†1:05 p m
Col., Cin., Ind., & St. Louis	*7:20 p m	*7:30 a m

☞ Molder's Text Book, Price $2.50 ☜

Pan-American Route

Between CLEVELAND and BUFFALO.

STEAMERS CITY OF BUFFALO AND CITY OF ERIE.

Both together being without doubt, in all respects, the finest and fastest that are run in the interest of the traveling public in the United States.

TIME CARD—DAILY—APRIL 15th to DEC. 1st.

Leave Cleveland 8 p. m. Arrive Buffalo 6:30 a. m. | Leave Buffalo 8 p. m. Arrive Cleveland 6:30 a. m.

ADDITIONAL SERVICE DURING JULY AND AUGUST DAILY EXCEPT SUNDAY.

Leave Cleveland.....8:00 a. m. | Leave Buffalo.....8:00 a. m.
Arrive Buffalo.....6:00 p. m. | Arrive Cleveland.....6:00 p. m.
Leave Cleveland Tuesdays, Thursdays and Saturdays 5 p. m. Arrive Buffalo 5:30 a. m.
Leave Buffalo Mondays, Wednesdays and Fridays 5 p. m. Arrive Cleveland 5:30 a. m.

All Central Standard Time. Orchestra Accompanies Each Steamer.

Connections made at Buffalo with trains for all Eastern and Canadian points, at Cleveland for Detroit and all points West and Southwest.

Ask ticket agents for tickets via C. & B. Line. Send four cents for illustrated pamphlet. SPECIAL LOW RATES CLEVELAND TO BUFFALO AND NIAGARA FALLS EVERY SATURDAY NIGHT. ALSO BUFFALO TO CLEVELAND.

W. F. HERMAN, General Passenger Agent, Cleveland, O.

Between the Lakes and the Gulf, the Mississippi and the Allegheny Mountains—the best buying section of the United States—is the BULK of THE IRON TRADE REVIEW'S circulation. In this section advertisers in all trade papers get best returns.

FOUNDRY COKE

Agents.
PINNICKINNICK COAL CO.
GENERAL HOCKING FUEL CO.
CONNELLSVILLE.
STONEGA.
POCAHONTAS.
72 HOUR FOUNDRY COKE.

O'GARA, KING & CO.
WESTERN UNION BLDG.
CHICAGO.

STANDARD BLOCK COAL CO.
MINES IN No. 8
PITTSBURG DISTRICT.
PIEDMONT.
CUMBERLAND.
BLOSSBURG.

SMITHING COAL

Every Mill Man
Should Keep Posted by Reading
Power and Transmission
a unique publication in trade literature exclusively devoted to
MODERN POWER TRANSMISSION ENGINEERING
copiously illustrated with typical installations. Other articles of interest to the up to date factory are also contained in each issue. Sample copy free by applying to
THE DODGE MANUFACTURING CO. ENGINEERS FOUNDERS MACHINISTS MISHAWAKA, IND. U.S.A.
BRANCHES ~ BOSTON NEW YORK CHICAGO CINCINNATI ATLANTA LONDON, ENG.

THE GOBEILLE PATTERN CO
CLEVELAND OHIO U S A

Any wood butcher can hang out his sign, advertise, and "make" patterns. We MANUFACTURE patterns. Our works is not a "shop" but a MILL and FACTORY. . . .

Note the distinction

STEEL CONSTRUCTION
in All Branches

BUILDINGS DESIGNED AND ERECTED
in all parts of the world

ROOF FRAMES AND TRUSSES
CUPOLAS, LADLES, CONVERTERS
BLAST FURNACES AND STEEL WORKS
BOILERS, TANKS, AND HEAVY PLATE WORK

RITER-CONLEY MFG. CO., PITTSBURG, PA.

FOR TESTING IRON ORE BODIES
or drilling deep test holes in ANY formation—gravel, boulders and rock. Drives 4, 6, 8 or 10-inch pipe, or drills holes that size in rock, and
Produces at the Surface Everything Found.
Tests for gold, lead, zinc, coal—everything. Can be used on boat, to explore river beds to bed rock. Water no hindrance. Drills water and oil wells quickly, cheaply and without skilled labor. Self-moving: complete.
Write for full information and catalogue.
THE KEYSTONE DRILLER CO.,
BEAVER FALLS PA., U.S.A.

Carborundum is like a good workman—
Give it something to do and it does it—
You don't have to watch it continually to get results.
Carborundum is the best grinding material known.
It cuts faster, cuts cleaner and smoother and lasts longer than any other abrasive—
And it does not wear smooth or gummy.
Requires practically no dressing—
Very important points these are in shop economy.

Shall we send you the Carborundum Booklet?

THE CARBORUNDUM COMPANY,
NIAGARA FALLS, N.Y.

OF INTEREST TO
Manufacturers

Write for copy of pamphlet just issued by the

ILLINOIS CENTRAL R.R. COMPANY

giving reliable information concerning nearly 200 desirable locations for industries, and entitled

INDUSTRIAL SITES IN TEN STATES

Address GEO. C. POWER,
Industrial Commissioner, Illinois Central Railroad
Room 506, Central Station, CHICAGO, ILL.

S. FIX SONS'
STEAM TUBE WELDING WORKS.
Manufacturers of reworked boiler tubes
Good second-hand tubes bought.
CLEVELAND O.